



# *MI Great Lakes Plan:*

*Our Path to Protect, Restore, and Sustain  
Michigan's Natural Treasures*



[www.michigan.gov/deqgreatlakes](http://www.michigan.gov/deqgreatlakes)

*Prepared by the Office of the Great Lakes  
Ken DeBeaussaert, Director*

*Michigan Department of Environmental Quality  
Steven E. Chester, Director*

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Randall McCune

M. Hodgkins

Robert DeJonge

Travel Michigan

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*January 2009*

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# *Executive Summary*

The Great Lakes are integral to the past, present, and future economic vitality of Michigan and the region. The health of the people of Michigan, our economy, and our quality of life depends on clean water and productive land that is sustainable far into the future.

The Great Lakes represent one-fifth of the world's fresh surface water and provide unparalleled recreational and economic opportunities to the 10 million people that call Michigan home. Studies show that the Great Lakes provide Michigan with 823,000 jobs that represent nearly 25 percent of Michigan's payroll<sup>1</sup>. Additionally, Great Lakes tourism generates billions of dollars each year from those who spend leisure time around our lakes and streams.

Michigan's water resources have been the catalyst for the economic development that moved us to international prominence. But those events have also left some communities with a legacy of pollution from contaminated sediments, invasive species, inadequate sewer systems, and uncontrolled development. These pressures put the lakes at risk – threatening our health and economic viability.

Michigan's citizens want solutions to these challenges; solutions that protect our water and capitalize on unique opportunities for economic transformation.

## **Economic Value of the Great Lakes**

Michigan is the Great Lakes state with more freshwater coastline than any other state in the nation. Our lakes, rivers, and streams define not only our boundary but also provide a path to environmental, economic, and social progress. Michigan's Great Lakes provide:

- Jobs for nearly 823,000 Michigan residents.
- A world-renown commercial and sport fishery - collectively valued at more than \$4 billion annually.
- Breathtaking scenic views and charming coastal resort communities that are the backbone of the state's \$12.8 billion travel industry.
- Water for an agriculture and food industry that is now the state's second largest industry.
- Invaluable source water to Michigan manufacturing that currently produces 60 percent of the continent's steel and 60 percent of automobiles made in North America.
- The basis for a charter boat industry that provides Michigan's economy with an estimated \$21 million in economic benefits annually.
- A maritime transportation network linking North America's heartland with ports and markets throughout the world.
- First class harbors and marinas that generate \$2 billion annually from the recreational boating industry.

## INVESTING IN THE GREAT LAKES = JOBS AND ECONOMIC TRANSFORMATION

In 2006, the Brookings Institution<sup>2</sup> reported that a regional investment of \$25 billion to implement the Great Lakes Regional Collaboration Strategy would result in short and long-term returns of \$80-100 billion, including:

- \$6.5-11.8 billion direct benefits from tourism, fishing, and recreation.
- \$50-125 million reduced costs to municipalities.
- \$12-19 billion increased coastal property values in Areas of Concern (\$3.7 - 7 billion for the Detroit metropolitan area alone<sup>3</sup>).

Further analysis by Michigan Sea Grant determined that this type of regional investment would result in a present, tangible value of \$7-13 billion for Michigan<sup>1</sup>. That estimate does not include the additional value added by making Michigan more attractive to talented workers and new businesses.

Past protection and restoration efforts have shown significant benefit to Michigan's economy. Since 2003, Michigan has invested more than \$1.5 billion in local water and sewer infrastructure improvements that have created 17,000 jobs<sup>4</sup>. Future investments in infrastructure improvements will better protect public health and result in additional job creation. The U.S. Conference of Mayors Water Council<sup>5</sup> estimates that adding one new job in the local public water and sewer sector creates 3.68 new, supporting jobs – a multiplier effect that will significantly boost Michigan's economy.

Part of that multiplier effect is tourism and water-related leisure activities. From 2000 to 2007, Michigan saw a 33 percent increase in tourism-related employment in coastal counties representing an increase of almost 20,000 jobs, an indication of the value of the Great Lakes to this sector and the increasing importance of the tourism sector to Michigan's economy<sup>1</sup>.

## THE MI-GREAT LAKES PLAN

In response to the economic and environmental imperative for protecting the Great Lakes, the Michigan Office of the Great Lakes (OGL), with input from thousands of stakeholders at more than 20 meetings across Michigan, led the effort to prepare and implement this plan designed to protect, restore, and sustain Michigan's Great Lakes for current and future generations.

While the 2005 Great Lakes Regional Collaboration (GLRC) Strategy reflects the protection and restoration efforts needed throughout the entire Great Lakes basin, the MI-Great Lakes Plan complements the GLRC by providing specific direction within Michigan. It addresses the recommendations of the GLRC,

*“Our responsibility is to protect, clean, and enjoy these waters and teach the world how to smartly manage a finite and increasingly valuable global resource.*

*Our opportunity is to capitalize on Michigan's location at the center of North America's 'freshwater coast.' In doing so, we can sustainably grow Michigan's economy and that of the whole Great Lakes region.”*

*- Lt. Governor John D. Cherry*

and highlights the specific needs, challenges, and strengths of our state. The fundamental premise of the MI-Great Lakes Plan is that the economy and the long-term wellbeing of our citizens are dependent on the health of the waters that feed the lakes and the nearshore areas that buffer the lakes.

Existing federal and state resources are insufficient to address the future needs to support local protection and restoration efforts such as brownfield cleanup, removal of contaminated sediments, habitat protection, and flow restoration. Michigan citizens recognize that it will take a collaborative investment of federal, state, and local governments, tribes, nongovernmental organizations, and private funds to realize the full economic and societal benefits that will result from protecting and restoring Michigan's Great Lakes.

It is our collective vision that the Great Lakes and the rivers bringing water to the Great Lakes will be the premier freshwater resource in the world and will sustain a healthy environment, strong economy, and high quality of life long into the future. This includes the vision of a sustainable Great Lakes ecosystem that ensures environmental integrity and supports economically viable and healthy communities. It is also our vision to protect, restore, and sustain the integrity of the Great Lakes ecosystem through collaborative partnerships.

## **PUBLIC INPUT: RECOMMENDATIONS AND OPPORTUNITIES**

Across Michigan, citizens and organizations agree that to protect and restore the Great Lakes, we must be firmly committed to their environmental and economic importance, adopt sustainable development policies that protect our water resources, and act to take advantage of the unique, long-term economic opportunities and responsibilities provided to the Great Lakes state.

To meet this commitment, Michigan needs to:

- Ensure that alternative energy sources are pursued and that the environmental impacts of current energy sources are minimized.
- Restore and delist Michigan's 14 Areas of Concern.
- Protect human health associated with fish consumption advisories and harmful algal blooms.
- Restore beaches by controlling pollutants such as phosphorus, pharmaceuticals, and bacterial contamination.
- Prevent the introduction and control the spread and of new invasive species.
- Update old and deteriorating infrastructure throughout the state.
- Ensure effective and efficient management of urban stormwater.
- Implement and share effective land use planning tools throughout the state and across county boundaries.
- Increase opportunities for the public to access the Great Lakes and our inland lakes and streams.
- Protect and restore critical fish and wildlife habitat.



The MI-Great Lakes Plan highlights the tremendous collaboration on the part of all who participated in its development and also identifies potential impediments to achieving further successful protection and restoration efforts. While there are numerous specific protection and restoration recommendations, there are also some common approaches identified to address the challenges, including:

- Increasing collaboration and communication among partners, especially when implementing environmental management efforts.
- Committing to the efficient and effective use of existing resources.
- Committing additional federal and state funding to develop long-term sustainable protection and restoration programs.
- Expanding educational efforts to build community-based, grassroots stewardship.
- Developing a statewide policy statement on the importance of Great Lakes protection and restoration.

## **IMPLEMENTING THE MI-GREAT LAKES PLAN**

Our goal is to ensure that the MI-Great Lakes Plan doesn't join other Great Lakes plans gathering dust on shelves. As part of the MI-Great Lakes Plan, an implementation team will be created to assist federal, state, and local efforts to enact the recommendations of the Plan. The implementation team will track progress and will promote the cooperation and collaboration needed to ensure successful follow-up.

## **SUSTAINABLE DEVELOPMENT**

At forums across Michigan, citizens reiterated that we must consider Great Lakes protection and restoration policies in light of their economic importance, recognize the value of the Great Lakes, and develop policies that protect this economic asset. The Michigan Land Use Leadership Council report, the upcoming Michigan Climate Action Council report, the ongoing work to focus Michigan on alternative energy, and the MI-Great Lakes Plan provide important recommendations for Michigan's federal, state, and local policymakers. State agencies can play a key support role, but with the overwhelming majority of Great Lakes shoreline in private ownership, sustainability is often based in local decisions and actions, whether by communities, individuals, or the private sector.

The opportunity for sustainable water-based economic development is literally all around us – responsible development can reclaim waterfront for residences, marinas, ports, restaurants, hotels, and offices. Success stories demonstrate that we can do all of that while sustaining the ecological integrity of our dunes, beaches, wetlands, and rocky headlands that make the Great Lakes so beautiful and desirable for solitary walks, sunning and swimming, boating, fishing, and recreation.



## **THE NEXT WAVE – A BLUE WATER ECONOMY**

There is another transformational economic opportunity that lies before us. We know that in the past, water was at the root of the wealth that was built in the Great Lakes region -- both as a conduit for commodities and as a manufacturing resource. We know today that water is still critical for Michigan businesses - including biofuels -- and, as global water shortages grow, the Great Lakes may again be a magnet for industries that rely on freshwater resources.

There is great potential in economic growth based around new specialized industries related to water technologies, wind energy production, pollution remediation, and eco-tourism. Recent studies indicate that water-related technology is a \$500 billion sector annually, and that approximately 22,000 jobs could be generated for every \$1 billion invested in water conservation programs<sup>6</sup>.

In the past, we relied on the lakes for industrial activity. In the future, Michigan's economy will increasingly depend on the Great Lakes for the quality of life they provide. What other state can claim the breathtaking beauty of both a sunrise side dawn over Lake Huron and a picturesque evening sunset in the western sky above Lake Michigan.

# *MI-Great Lakes Plan: Our Path to Protect, Restore, and Sustain Michigan's Natural Treasures*

## **BACKGROUND**

The Great Lakes are Michigan's natural resource treasures; they shape our state, our lives, and our economy. But these treasures demand increased attention at the state, local, and national levels. In response to this need, on June 4, 2008 Lt. Governor John Cherry and the Michigan Office of the Great Lakes (OGL) announced the effort to develop a new Michigan Great Lakes restoration initiative at an event with various representatives of state and federal government, the scientific and conservation communities, tribes, and grassroots advocates.

This new effort builds upon the tremendous investment of time, passion, and money this state has made to protect, restore, and remediate the forces that continue to threaten the health of the Great Lakes. Michigan has been a leader within the Great Lakes region in protecting these spectacular waters. State and local units of governments have invested billions of dollars towards this effort. We have nurtured a sport fishery that is unrivaled in the world. Michigan was the first Great Lakes state to ban the discharge of untreated ballast water at our ports. Visitors come from far and wide to play on our state and local beaches, launch their boats at publicly owned access sites, and camp in the state parks that line our shoreline. These and other actions that have been undertaken are highlighted in the State of the Great Lakes report at [http://www.michigan.gov/documents/deq/deq-ogl-StateGLRpt2007\\_219068\\_7.pdf](http://www.michigan.gov/documents/deq/deq-ogl-StateGLRpt2007_219068_7.pdf).

## **Great Lakes Governors' Priorities**

In 2003, looking towards a vision that the Great Lakes will be the premier freshwater resource in the world and will sustain a healthy environment, strong economy, and high quality of life long into the future, the Great Lakes Governors adopted nine priorities that embody the goals of protecting and restoring the natural habitat and water quality of the Great Lakes Basin, preserving diverse plant and animal communities, protecting the water supply, and safeguarding human health. Acknowledging that the state and local entities have already invested and will continue to invest significant resources in efforts designed to attain these goals, the Great Lakes Governors asked that the federal government also make a long-term, large-scale financial commitment to the Great Lakes.

## THE NEXT WAVE – A BLUE WATER ECONOMY

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Part of that multiplier effect is tourism and water-related leisure activities. From 2000 to 2007, Michigan saw a 33 percent increase in tourism-related employment in coastal counties representing an increase of almost 20,000 jobs, an indication of the value of the Great Lakes to this sector and the increasing importance of the tourism sector to Michigan's economy<sup>1</sup>.

<b>Lake-related Industry</b>	<b>Jobs in 2007</b>	<b>Jobs in 2000</b>	<b>Change 2000 to 2007</b>	<b>% change</b>	<b>Total compensation 2007 (millions)</b>
Farming, coastal	30,901	32119	-1,218	-3.8%	413
Fishing, coastal	4,865	5804	-939	-16.2%	104
Utilities, coastal	6,920	8747	-1,827	-20.9%	770
Warehousing and Transportation, coastal	67,032	68293	-1,261	-1.8%	3,342
Tourism, coastal	74,676	56072.8	18,603	33.2%	1,706
Engineering, specific occupations	2,460	2570	-110	-4.3%	155
Science, specific occupations	4,900	2670	2,230	83.5%	270
Mining, except oil and gas	6,498	7835	-1,337	-17.1%	430
Durable Goods Manufacturing	496,070	727811	-231,741	-31.8%	40,256
Non-durable goods Manufacturing	129,350	159071	-29,721	-18.7%	7,398
All MI lake-related Jobs	823,672	1,070,993	-247,321	-23.1%	59,283
All MI Jobs	5,450,992	5,629,498	-178,506	-3.2%	232,822
Percentage considered lake related	16.5%	20.4%			25.5%

Table 1. Summary of employment and compensation in lake-related industries<sup>1</sup>

Although the overall number of jobs associated with the Great Lakes has declined due to job losses associated with manufacturing decline, the protection and restoration of the Great Lakes offer a doorway to new, sustainable economic growth. Job losses have occurred in sectors related to diminishing 20th Century industries, while major growth has occurred in 21st century sectors like tourism and infrastructure renewal.

There is another transformational economic opportunity that lies before us. We know that in the past, water was at the root of the wealth that was built in the Great Lakes region -- both as a conduit for commodities and as a manufacturing resource. We know today that water is still critical for Michigan businesses - including biofuels -- and, as global water shortages grow, the Great Lakes may again be a magnet for industries that rely on freshwater resources.

In the past, we relied on the lakes for industrial activity. In the future, Michigan's economy will increasingly depend on the Great Lakes for the quality of life they provide.

### **VISION FOR MICHIGAN'S GREAT LAKES PROTECTION AND RESTORATION EFFORT**

Whether you're looking over the rocky shores of Lake Superior, watching the sun rise over Lake Huron, climbing the dunes on the shores of Lake Michigan, walleye fishing on Lake Erie, or just enjoying a walk along the river that runs through your town, we in Michigan are united by the beauty, the wonder, and the power of water. It is in these moments that we feel our connection to the water, and it is this water that is our state's defining resource and that gives Michigan its sense of place.

It is our collective vision that the Great Lakes and the rivers bringing water to the Great Lakes will be the premier freshwater resource in the world and will sustain a healthy environment, strong economy, and high quality of life long into the future. This includes the vision of a sustainable Great Lakes ecosystem that ensures environmental integrity and supports economically viable and healthy communities. It is also our vision to protect, restore, and sustain the integrity of the Great Lakes ecosystem through collaborative partnerships. This vision includes a Great Lakes system where we have:

- Ensured that no new aquatic invasive species (AIS) are introduced into Michigan waters and onto Michigan lands.
- Conserved and enhanced Michigan's fish and wildlife by protecting and restoring the ecological processes that sustain them.
- Adopted a long-term goal of virtually eliminating the release of, and exposure to, persistent bioaccumulative toxics (PBTs) and other toxics substances into the Great Lakes Basin ecosystem to protect human health, fisheries and wildlife populations, and the aquatic environment.
- Restored the beneficial uses currently impaired at the 14 Michigan Areas of Concerns (AOCs).
- Controlled pollution from nonpoint sources (NPS).
- Used standardized and scientifically valid data to make the best decisions.
- Incorporated the principles of sustainability into the principles and practices of the activities of Michigan's citizens and public and private entities while sharing a commitment to protect and enhance and acting as wise stewards of the waters, lands, and related resources of the state of Michigan.
- Linked environmental, economic, and social objectives for sustainability.

- Recognized that regional, watershed, or lake specific goals, objectives, and priorities are appropriate.
- Acknowledged that economic conditions in Michigan and available public resources will require both careful examination of existing programs to determine where resources can be shifted to higher priorities, expand cooperative actions with private sector partners, and greater flexibility in the use of new or existing federal funds.
- Established an effective and reliable system to monitor the future health of the Great Lakes ecosystem.

State, local and federal governments; private business; citizens and others have invested and will continue to invest significant resources in programs designed to attain this vision. It is our vision that this partnership continue and that the effort will foster increased collaboration and coordination necessary to address the critical issues identified in this report.

As the 2005 Brookings Institute report, *Healthy Waters, Strong Economy: The Benefits of Restoring the Great Lakes System* concluded, we are confident that the efforts identified in the MI-Great Lakes Plan will have significant economic benefit to the state of Michigan and the Great Lakes region. We believe these efforts will:

- Lead to direct short and long-term economic benefits.
- Directly raise coastal property values.
- Reduce costs to municipalities.
- Produce economic activity by making the state and the region more attractive to business and workers.

## MI-GREAT LAKES PLAN

The Great Lakes Regional Collaboration (GLRC) Strategy reflects the protection and restoration efforts needed throughout the Great Lakes Basin. The *MI-Great Lakes Plan: Our Path to Protect and Restore Michigan's Natural Treasures* (MI-Great Lakes Plan) provides specific direction within Michigan to address the recommendations of the GLRC Strategy and take further steps to address the specific needs within the state.

The MI-Great Lakes Plan is not intended to identify every action necessary to protect and restore the Great Lakes. Such a list would be exhaustive and become quickly dated. Instead, the MI-Great Lakes Plan provides a mechanism to consider and reevaluate the commitment of existing resources; identify public investments in protection and restoration

### Great Lakes Regional Collaboration

The Great Lakes Regional Collaboration (GLRC) was initiated in response to the issuance of a Presidential Executive Order calling for improved federal coordination and efficiency of Great Lakes programs through the initiation of “a regional collaboration of national significance” to create a national action agenda for the Great Lakes. Michigan and others joined the GLRC in the belief that an additional long-term, large scale federal funding commitment is necessary to address restoration goals. The GLRC culminated with the release of the GLRC Strategy (<http://www.glrc.us>) in December, 2005. The report provides specific restoration strategies and recommendations for the Great Lakes restoration priorities.

that can make the most significant, positive contribution to the future of the Great Lakes; and establish consensus, action priorities that can be implemented through more effective use of existing resources, expanded collaboration between government agencies and the private sector, and targeted efforts to secure new resources where funding shortfalls are identified. Importantly, this plan recognizes that significant efforts are already underway and that the need to continue and expand those efforts is essential to the continued protection and restoration of the Great Lakes. The MI-Great Lakes Plan stresses that the health of the waters that feed the Great Lakes and the near-shore areas that buffer the lakes are key components to the overall health of the Great Lakes.

## **MI-GREAT LAKES PLAN DEVELOPMENT**

The OGL, working with representatives of the Michigan Departments of Environmental Quality (MDEQ), Natural Resources (MDNR), Agriculture (MDA), Community Health (MDCH), Public Service Commission, History, Arts, and Libraries, Labor, Energy, and Economic Growth, Transportation (MDOT), and Travel Michigan developed Internal Action Teams based on eight priority areas for restoration identified by the Great Lakes Governors'. The eight restoration priority areas are:

- Aquatic Invasive Species
- Habitat/Species
- Coastal Health
- Areas of Concern (AOC)/Sediments
- Nonpoint Sources
- Toxic Pollutants
- Indicators and Information
- Sustainable Development (including sustainable energy and assuring a strong economy)

In addition, the recommendations of the MUCC report, *Michigan's Role in Great Lakes Protection and Restoration; Analysis and Recommendations*, which includes a gap analysis comparison of the GLRC Strategy recommendations and Michigan's current activities, programs and policies, were used as a basis for the draft action framework. This draft action framework was intended to provide a starting point for discussion of actions necessary to protect and restore the Great Lakes.

On August 6, 2008, over 100 key stakeholders met to review the draft action framework. The stakeholders provided conceptual recommendations and assisted in identifying specific efforts that should be included in the final MI-Great Lakes Plan.

Recognizing the importance of local watershed efforts, the MI-Great Lakes Plan development process included a series of geographically focused input sessions. As a result of the diverse spectrum of input received during this development process, the MI-Great Lakes Plan reflects a consensus on specific direction needed within Michigan to protect and restore the Great Lakes. Our goal is to ensure that the MI-Great Lakes Plan doesn't join other Great



Lakes plans gathering dust on shelves. As part of the MI-Great Lakes Plan, an implementation team will be created to assist federal, state, and local efforts to enact the recommendations of the Plan. The implementation team will track progress and will promote the cooperation and collaboration needed to ensure successful follow-up.

## *Great Lakes Compact Signed*

In 2003, the Great Lakes Governors adopted nine priorities that embody the goals of protecting and restoring the natural habitat and water quality of the Great Lakes Basin. Eight of the priorities are addressed in this report. The first priority is:

“Ensure the sustainable use of our water resources while confirming that the States retain the authority over water use and diversions of Great Lakes water.”

In 2005, following a nearly five-year negotiation, the Great Lakes Governors reached agreement on the Great Lakes Compact, providing a comprehensive management framework for achieving sustainable water use and resource protection. The eight Great Lakes States reached a similar, good faith, agreement with Ontario and Québec.

Since 2005, each of the eight Great Lakes State Legislatures ratified the Compact. With Governor Jennifer M. Granholm’s signature on July 8, 2008, legislative action was completed. At the federal level, a resolution of consent to the Compact was approved by the U.S. Senate in August, 2008, and by the U.S. House of Representatives in September, 2008. On October 3, 2008, President George W. Bush signed the joint resolution of Congress providing consent to the Great Lakes-St. Lawrence River Basin Water Resources Compact. The President’s action marks the final step in the Compact’s approval process thus enabling these historic protections to become law.

Additional efforts must be now undertaken to achieve the goals and implement the commitments outlined in the Compact. These efforts will include developing water conservation programs, compatible water use reporting systems and science-based approaches for state management of water withdrawals across the Great Lakes Basin. These actions will impact on our efforts to protect and restore the Great Lakes. Because of the historic process used to address this priority, the MI-Great Lakes Plan will not make additional recommendations.

The other eight goals identified by the Governors were the basis for the development of the GLRC Strategy and subsequently became the basis for the framework of the MI-Great Lakes Plan.

## *Great Lakes Protection and Restoration Issues – the Public's Perspective*

In October 2008, the Office of the Great Lakes released the draft MI-Great Lakes Plan for public comment. During October and November, 2008, Lt. Governor John D. Cherry, the OGL and MUCC met at eight locations representing different watershed areas of Michigan to ask local opinion leaders and the public to describe for their area:

- Important Great Lakes protection and restoration issues.
- Current protection and restoration efforts occurring in their area.
- Economic value of protecting and restoring the Great Lakes.
- Opportunities to advance protection and restoration efforts.
- Impediments protecting and restoring efforts through improved collaborative coordination.

While the priorities for protection and restoration efforts varied from one area of the state to another, a number of common protection and restoration recommendations were identified at many of the meetings, and in many instances common themes arose.

One example of differing priorities was the difference between the need for protection versus restoration of our Great Lakes. In the northern areas of the state, there is a strong preference for protecting our pristine areas before they become impaired. In the more developed areas there is a high priority for restoring those areas impacted by historical contamination.

The following are common recommendations identified at many of the watershed meetings:

- Need to increase collaboration and communication among all partners, especially in sharing experiences of implementing sustainable practices.
- Need to develop a statewide policy statement on the importance of Great Lakes protection and restoration.
- Need strong commitments of funding both at the state and federal level, including dedicated funding for state agencies, local governments and local watershed management to develop long-term sustainable programs.
- Need to consider possible means to reengineer local/state/federal environmental management efforts, including looking at current federal and state programs and local watershed management programs, to look at new ways to address water issues within Michigan to ensure that limited resources are used efficiently and effectively.
- Need to control and prevent the introduction of invasive species, including the regulation of ballast water discharges and control of the spread of invasive plants such as Phragmites.

- Need to increase the educational efforts for Michigan students, citizens and local officials about the value of our Great Lakes resources, explaining why stewardship roles are important and what the benefits are to the health Great Lakes system.
- Need to find ways to mobilize volunteers for protection and restoration efforts. Also need to find opportunities to get people engaged with the water resources of the state to encourage stewardship.
- Need to increase opportunities for the public to access the Great Lakes and our inland lakes and streams, including ensuring harbors are dredged to support our recreational boating and commercial shipping.
- Need a strong commitment to improve the infrastructure within Michigan's communities, including funding to control combined sewer overflows (CSOs) and improve wastewater and water treatment facilities. This also includes the need enact a statewide sanitary code to improve on-site waste treatment and the need to continue to address brownfield redevelopment.
- Need to implement and share planning tools across communities and to look at other examples of how land use planning practices are most effectively implemented considering both limitations and opportunities, especially related to shoreline development and nearshore water use.
- Need to ensure the management of stormwater is effective and efficient and that sufficient funding is available at the state and local levels.
- Need new efforts to control pollutants such as phosphorus and pharmaceuticals. There was also strong support for a statewide ban on phosphorus in lawn fertilizers and dishwasher detergent.
- Need to consider dam removal (where and when appropriate), including long-term funding incentives.
- Need to treat the Great Lakes as an economic asset, and as such they will be protected because of the value they provide. Michigan's long-term economic prosperity hinges on the quality of the Great Lakes.
- Need to address the human health associated with the Great Lakes, including elimination of fish consumption advisories and harmful algal blooms.
- Need to ensure that alternative energy sources are pursued and that the environmental impacts of current energy sources are minimized. In addition, new energy policies and energy production need to be considered with regard to their effects on the Great Lakes.
- Across the state, success stories are occurring to protect and restore watershed and the Great Lakes which need to be shared.

The following is a listing of issues that were identified in each of the areas where public meetings were held. Please note that the above issues were also identified in many of these meetings.

### **UPPER PENINSULA AREA ISSUES**

The consensus in the Marquette area was the need to focus on protection, more so than restoration. Other key issues that were identified in the Marquette area included the potential impacts of the proposed mine in the Salmon-Trout River and other potential metal mining in the area. It was also noted that the Northern Initiatives Great Water Program has incorporated the "triple bottom line" approach (environment, economy, and people) to capital, information, and new markets for business promotion such as eco-tourism. Consideration of this concept may be appropriate for other protection and restoration initiatives.

In addition, other important issues include:

- Land fragmentation impacting watershed functions.
- Identifying strategies for local pollution prevention, including mercury reductions and stormwater control.
- Continued support of the Lake Superior Binational Program as a zero discharge demonstration program.
- Concern about the impacts of off-road vehicles on habitat.
- Need to eliminate the barriers for restoration including the need for annual audits and engineering plans for small projects.

### **CLINTON RIVER WATERSHED AREA ISSUES**

A key theme expressed by the public in the Clinton River watershed was the need to provide flexibility for a regional approach to watershed management. In addition, community planning was identified as a successful local approach to effective watershed management.

Continuing efforts to educate Michigan citizens was identified as a priority, particularly targeting programs towards children that emphasize the importance of Michigan's natural resources and stewardship. Land conservancies and watershed councils in southeast Michigan currently play a key role in educating the public through community relations and local projects. The need to coordinate and promote volunteer opportunities to foster local environmental and conservation stewardship among citizens was also identified as a priority.

Due to most waterfront property being held in private ownership, there is a need to reconnect Michigan citizens to the Great Lakes by increasing access to recreational opportunities, development, and cultural opportunities in order to gain support for and to be effective in protection and restoration efforts.

Other important issues identified include:

- Need to address who has responsibility, ownership or jurisdiction to fund and remove log jams.
- Need to let local governments implement and perform watershed technology advancements, loosen up regulatory controls and change oversight protocols.
- Need to recognize the importance of land conservancies.
- Need to recognize the importance of habitat and flow needed to support a strong fish population.
- Need to control cormorants.
- Need to expand the real-time water quality monitoring program.

## **NORTHEASTERN MICHIGAN AREA ISSUES**

A key theme expressed by the public in the northeastern Michigan area was that Michigan's long-term economic prosperity hinges on the quality of the Great Lakes. In addition, it is felt that the value of the Great Lakes will increase over time and as a result there will be a greater demand for water thus increasing its value. Communicating the value of water to Michigan citizens and the importance of water conservation practices was also important.

Another key issue focused on the need to address dams that are no longer economically or physically viable; this included the need to develop a funding source for removal of these dams as well as a way to conduct analysis of dams. In addition, there is a need to protect high quality habitat and streams by effectively addressing soil erosion and sedimentation, culvert design, local infrastructure as well promoting low impact land use planning practices.

This area also recognized the importance and identified a need to educate Michigan citizens about the value of the Great Lakes and the natural resources in the state and to identify actions that citizens can take in their daily lives to protect and restore the Great Lakes. The benefits of protecting and restoring the Great Lakes needs to be communicated to the community level to effectively develop community support, involvement and to foster local environmental and conservation stewards. There is also a need to communicate the important role of community planning and development. In addition, there is a need to look at investing in the protection and restoration of the Great Lakes as a means to increase recreational opportunities, development, and cultural opportunities to grow our economy in a sustainable way. In addition, other important issues included considering designating the Great Lakes Basin as a World Heritage site.

In addition, other important issues include:

- Strengthen the Michigan Natural Rivers Program.
- Concern regarding leaking oil and gas wells.
- Need to have better planning tools and training for local governments that are economical and easily accessible.
- Need boater education initiative to ensure invasives species are not being spread to other waters, especially inland lakes.

## **SOUTHEAST MICHIGAN AREA ISSUES**

A key theme expressed by the public in the Detroit area was that Michigan's long-term economic prosperity hinges on the quality of the Great Lakes with the value of water to current and prospective businesses as well as the quality of life they provide to current and prospective residents. In addition, it is felt that the value of the Great Lakes will increase over time and as a result there will be a greater demand for water increasing its value. Water should be considered an asset and that asset can be a driver for economic development.

There is a need to continue to develop community support and community involvement and to ensure support of local environmental and conservation stewards. This theme includes the need to market Great Lakes protection and restoration, stressing the economic development potential of such an effort. Investing in Great Lakes protection and restoration means increased recreational opportunities, development, and cultural opportunities to grow our economy in a sustainable way.

Another common theme is the concern regarding the current and potential impacts of invasive species on the Great Lakes and the local rivers and lakes. This includes regulating ballast water and addressing milfoil in local inland lakes.

The importance of regional collaborations on current and future efforts to protect and restore the Great Lakes was emphasized. The role of the Michigan Department of Transportation programs in developing new recreational opportunities was discussed in the light of the Southeast Michigan greenways development. This includes the use of sustainable practices as a driving force, realizing the economic base is changing and an appreciation for green infrastructure is growing. There is also strong support for the need to maintain the local infrastructure, including minimizing CSO and improving local wastewater and water treatment facilities.

In addition, other important issues include:

- Need to review state legislation to allow local governments to transfer property to other local units, where appropriate.
- Need to find better ways to inform the public as to the environmental state of the Great Lakes.
- Need to develop a vision as to what our waterfronts should look like.
- Need to develop a strategy to recognize, protect and ensure the stability of the southeast Michigan fishery.
- Need for continuing dialog between government and nongovernmental organizations (NGOs) regarding the Great Lakes and other water resources and their importance to the future of the region.

### **SAGINAW BAY WATERSHED AREA ISSUES**

A key theme expressed by the public in the Saginaw Bay Watershed area was the importance of controlling pollutants, such as phosphorus, to Saginaw Bay from sources such as combined sewage overflows, agriculture, and on-site septic systems. The public is concerned about their inability to groom local beaches (state and federal permit coordination and timing), the invasion of Phragmites and the need for beachfront restoration. It was stated that the muck and zebra mussels are ruining beaches and lowering property values on Saginaw Bay. There was also strong support for a statewide ban on phosphorus in lawn fertilizers and dishwasher detergent.

Another common theme is the concern regarding the lack of access to Saginaw Bay and the impact on boating and tourism in the region.



It was also stated that more assistance, incentives and recognition of local communities is needed to ensure the protection of local water resources. There is strong support for funding for investing in the local infrastructure, including minimizing CSOs and improving local wastewater and water treatment facilities. There is a strong need to increase community and personal involvement in protection and restoration efforts. As a result, there is also a strong desire to address the Saginaw River/Bay AOC, recognizing that de-listing will lead to both environmental and economic improvement.

In addition, other important issues include:

- Need to minimize the impact of pollutants from the rivers into Saginaw Bay, especially looking at sources of phosphorus and emerging contaminants (pharmaceuticals)
- Need to look at the potential use of Phragmites and algae as biofuels.
- Concerns were raised about the Michigan future energy needs and the impact of certain production choices could have on human and ecological health including concern about the potential impact of nuclear power production and mining of uranium.
- Need to protect wetlands as a means of sustaining water quality.
- Problems with legislation that requires notification of CSO discharges and concerns regarding the impacts on economic development and public attitudes towards Saginaw Bay and the Saginaw River system.

## **WEST MICHIGAN AREA ISSUES**

A key theme expressed by the public in the West Michigan area was that of the importance of regional collaborations on current and future efforts to protect and restore the Great Lakes. This includes building on their use of sustainable practices as a driving force, realizing that the economic base is changing, and appreciation of the role and value of both green infrastructure and ecotourism. There is a need to continue to develop community support and community involvement and to ensure support of local environmental and conservation stewards. This theme includes the need to market Great Lakes protection and restoration, stressing the economic development potential of such an effort.

A common theme of the need to harness the potential volunteer efforts in the region was expressed. To accomplish this, the protection and restoration recommendations need to be stated as actionable efforts that local groups with volunteers can undertake. More assistance, incentives and recognition of local communities is needed to ensure the protection of local water resources. There was also strong support for a statewide ban on phosphorus in lawn fertilizers and dishwasher detergent. In addition, there was support for expanded dam removal efforts and financial assistance.

Another common theme is the concern regarding the current and potential impacts of invasive species on the Great Lakes and the local rivers and lakes. This includes regulating ballast water and keeping the Asian carp out of the Great Lakes.

There is strong support for the need to invest in the local infrastructure, including minimizing CSOs and improving local wastewater and water treatment facilities. There is also a strong desire to address the local AOCs, recognizing that de-listing will lead to both environmental and economic improvement. In addition, there is a sense that the current quality of life is threatened due to the impact of development on coastal resources. There is also a realization that keeping a local agricultural economy is important.

In addition, other important issues include:

- Need to minimize the impact of pollutants from the rivers into Lake Michigan especially looking at waterborne pathogens and emerging contaminants.
- Need to address the potential human health issues, including fish consumption advisories and harmful algal blooms.
- Should consider the creation of a ballast water compact if federal legislation is not enacted.
- Need to recognize the importance of working lands conservation programs to protect water quality. Such conservation programs include the Farm Bill programs and other United States Department of Agriculture (USDA) conservation programs available to private landowners to address existing resource concerns.
- Need to recognize and fully fund Michigan Conservation Districts as the important locally based delivery system for state and federal programs and the important role they play in bringing diverse groups together for a common goal.
- Need to recognize the need to better address the issue of Concentrated Animal Feedlot Operations in the state.

## **NORTHWEST MICHIGAN AREA ISSUES**

A key theme expressed by the public in the Petoskey area was the importance of the critical role of local watershed groups in planning and implementing protection and restoration measures. These groups have the local connections and interests to make things relevant and to make things happen. Another concern is the cleanup and disposal related to contaminated sites (i.e. Bay Harbor) in the Petoskey area. The area also identified the need to build better linkages between state agencies and state universities. Lake associations were also identified as important allies in protecting and restoring watersheds. There was a strong message that protection of high quality rivers, lakes and streams was critical to the future of Northwest Michigan.

In addition, other important issues include:

- Ensure that the Great Lakes are not a source of invasive species to inland lakes.
- Ensure that land conservation incentives, a component of sustainable development, are supported.
- Develop the concept of working waterfronts as a component of sustainable development.
- Ensure climate change mitigation is considered as a potential mechanism for Great Lakes protection and restoration.
- Need better collaboration between colleges and universities and the research needs for ensuring Great Lakes protection and restoration.

## **SOUTHWEST MICHIGAN AREA ISSUES**

Key themes expressed by the public in the Kalamazoo area were the importance of non-point pollution control, regulations of confined animal feeding operations, dune preservation, land use fragmentation/land-use decisions, and contaminated sediment remedial programs. Tourism was identified as a key incentive for protection and restoration actions associated with access and increased appreciation of the Great Lakes.

In addition, other important issues include:

- Agency input to local protection and restoration projects is essential.
- Education on specific issues such as fish consumption advisories and more broadly the Great Lakes.
- Rapid response capacity to new invasive species needs to be available and has to include early detection.
- Coldwater fisheries habitat needs to be protected in southwest Michigan.
- The Great Lakes may become a location for a variety of renewable energy installations and that should be addressed.

# *Aquatic Invasive Species*

## BACKGROUND

Aquatic invasive species (AIS) are a serious problem in Michigan. The aquatic ecosystems and water infrastructure of the state are under assault by AIS already here and are threatened by new invasions. Significant progress over the previous three decades to restore the Great Lakes has been interrupted and undermined by the present crisis of AIS. Industrial and municipal water infrastructure in Michigan has incurred significant costs associated with control of AIS. Water recreation of all types is seriously impacted by AIS, to the detriment of present and future use of the state's waters. An AIS is defined as a plant or animal: 1) that is not native, and 2) whose introduction causes, or is likely to cause, economic or environmental harm or harm to human health.

AIS arrive in Michigan and spread throughout the state via a number of pathways, including ballast water in ships, recreational activities, and organisms in trade. Closing the pathways will take a coordinated effort on the part of governmental agencies, businesses, and water users. Michigan should develop a long-term funding proposal to secure state support for AIS prevention and management.

## SUCCESS STORIES

**Ballast Water Regulation:** Governor Jennifer M. Granholm signed bipartisan legislation, Public Act 33 of 2005, to protect Michigan waters from AIS introductions from the ballast water of oceangoing vessels. Ballast water discharges from ocean-going ships are now required to be treated by methods determined by the MDEQ to be effective in preventing the discharge of AIS. The new ballast water permitting process that came into effect January 1, 2007, allows the MDEQ to monitor and regulate the ballasting and de-ballasting activities of oceangoing vessels engaging in port operations in Michigan. When no discharge is planned, operators of oceangoing ships must provide written certification to the MDEQ that ballast water will not be discharged while in port. Discharged ballast water must be treated by a state-approved method. As of October 2008, the MDEQ had issued 107 permits to 31 international shipping companies to conduct port operations in Michigan. In 2007, a lawsuit was filed in federal court by shipping interests, which sought to nullify the ballast water regulations law (Public Act 33 of 2005). The court dismissed the suit, due to the fact that Michigan is facing a serious threat to its environment caused by AIS, has determined the likely avenues by which those species are being introduced, and has taken measures to stop this introduction with the permit legislation. The MDEQ will continue to require permits for oceangoing vessels and in the absence of protective federal policies, encourages other Great Lakes states to enact laws to regulate ballast water discharges and further protect the Great Lakes from AIS.

**Phragmites Control Demonstration:** *Phragmites australis*, also known as common reed, is a perennial, wetland grass that can grow to 15 feet in height. While *Phragmites australis* is native to Michigan, an invasive, nonnative, variety of *Phragmites* is becoming widespread and is threatening the ecological health of wetlands and the Great Lakes coastal shoreline. *Phragmites* tend to create dense stands which degrade wetlands and coastal areas by crowding out

native plants and animals, blocking shoreline views, reducing access for swimming, fishing, and hunting, and potentially creating fire hazards from dry plant material. In response to the growing need to address the rapid spread of Phragmites in Saginaw Bay, and to better communicate effective treatment methods and regulatory requirements to the public, the MDEQ and the MDNR in partnership with United States Environmental Protection Agency (USEPA)-Great Lakes National Program Office (GLNPO) are cooperating with other agencies and local stakeholders to implement a Phragmites control demonstration project along selected reaches of Phragmites-infested public and private owned shorelines (e.g., Great Lakes coastal wetlands). The MDEQ has received funding from the GLNPO for this effort. Other contributors to this project include Ducks Unlimited, Cygnet Enterprises, Consumers Energy, and Hampton Township. The project will demonstrate control methods for Phragmites that can result in restoration of native plant communities, shoreline views, and recreational activities. The control plots will be chemically or mechanically treated to demonstrate to landowners the effectiveness of the treatment method and the benefits of managing Phragmites on their property.

### **MICHIGAN’S AQUATIC INVASIVE SPECIES PREVENTION AND CONTROL GOAL**

Prevent all new introductions of AIS into Michigan, stop the spread of AIS within the state and clearly identify and organize responsibilities and authorities for AIS prevention, control, monitoring, regulation and outreach/education within the appropriate state agencies and partners.

### **RECOMMENDATIONS THAT CAN BE ACCOMPLISHED WITHIN EXISTING FUNDING CONSTRAINTS THROUGH INCREASED COLLABORATION**

It should be noted that Michigan currently has limited funding for the efforts identified below; however, if the AIS goal is to be achieved, continuation of existing programmatic funding is essential.

- A. Michigan should review the effectiveness of AIS state laws, at both the state level and in concert with federal laws.
- B. Michigan should continue to communicate to the public the responsibilities and authorities for AIS prevention, control, monitoring, regulation and outreach/education among the appropriate state agencies.
- C. Michigan should develop a statewide strategy using an Integrated Pest Management approach, to identify invasive species in Michigan, to determine their potential to affect native landscapes and species, and to identify opportunities for control.
- D. Michigan should develop a statewide strategy using an integrated pest prevention approach to protect the state from new species introductions.
- E. Michigan should continue to coordinate the Great Lakes ANS Coalition entered into with other states in the Great Lakes Basin to implement on a Basin-wide basis water pollution laws that prohibit the discharge of AIS into the Great Lakes from oceangoing vessels.
- F. Michigan should ensure that vessels operating exclusively within the Great Lakes, “Lakers” are not a vector to reduce the spread of AIS and diseases already in portions of the Great Lakes.

- G. To prevent introduction and spread of AIS in Michigan waters through trade (e.g. water gardening, bait, aquariums, live food, etc.), Michigan should use a science based approach to develop a list of species of concern for Michigan and an immediate moratorium by the state on the trade of species on that list, until the species are screened and approved for trade under federal law. In addition, Michigan should organize and codify all the laws, regulations, mandates and rules dealing with the trade of live organisms.
- H. Michigan should fully participate in the Great Lakes Fishery Commission's sea lamprey control program and continue to provide regulatory input for the process.
- I. As invasive species are identified under habitat protection and restoration programs and pesticides are considered as a tool for control, MDA should be consulted for input on legal pesticide use recommendations, availability of pesticides registered for use in Michigan and definition of correct pesticide applicator certification and licensing categories and pesticide use regulations. In situations where endangered or threatened species are identified at risk, MDA should be consulted when pesticide use is considered. State and federal pesticide authorities offer a mechanism to either make tools available (under special registration) or restrict use (under specific label use direction) to attain the desired outcome.
- J. Michigan should integrate an evaluation component into future educational efforts to ensure AIS outreach and education programs targeting stakeholders are achieving desired results to maximize actions that prevent and control AIS in Michigan. In addition, evaluation components should measure stewardship changes leading to a decline in introductions whenever possible.
- K. Michigan should undertake an AIS pathway analysis and identify appropriate closure actions. This information should be included in the state's AIS management plan.

### **RECOMMENDATIONS NEEDING ADDITIONAL FUNDING TO ACCOMPLISH**

It should be noted that Michigan may have limited funding for some of the efforts identified below; however, if the AIS goal is to be achieved, significant new resources will be essential.

- A. Michigan should establish an early detection and rapid response program for AIS new to the state, including:
  - Establishing a \$1 million revolving fund for rapid response actions.
  - Development of risk assessment tools to target early detection.
  - Identifying responsible departments within the state for response to organism types.
  - Collaborating with an interagency, Great Lakes Federal Rapid Response Team that will conduct activities on federal lands, and in other locations with state, tribal, and local cooperation.
  - Identifying a central monitoring coordinator [e.g., National Ocean and Atmospheric Administration (NOAA) or the MDEQ] and prioritizing monitoring based on risk by ranking all high risk species and high risk areas in Michigan.
- B. Michigan should continue to increase coordination among organizations and agencies doing education and outreach on the issue of AIS and diseases in order to avoid duplicate efforts, use common messages whenever possible and increase effective use of limited resources. Michigan should also actively pursue and develop joint ventures between industry/government/academics (for example, Clean Marinas). In addition, the development of a

comprehensive database of existing AIS education and outreach programs would also help to avoid duplication of efforts and improve communication within and between agencies and citizens about these programs and databases.

- C. Michigan should identify means to significantly increase resources for the enforcement of laws governing the trade of live organisms and develop and fund an outreach and education plan for information dissemination to retail outlets that deal in the trade of live organisms when new animals or plants are added to the restricted or prohibited species list.
- D. Michigan should develop voluntary agreements and codes of best practices for industrial trade groups to prevent new introductions. In addition, economic requirements and incentives should be investigated to encourage commitment and successful implementation of these agreements and best practices (e.g., bonds or insurance).
- E. Michigan should establish a coordinated data management system, through the Smithsonian Institution, the NOAA, Great Lakes Environmental Research Laboratory, or other suitable entity, to develop an accessible, integrated, and centralized database that allows for the reporting and tracking of AIS infestations.
- F. Michigan should develop a system for collection and identification protocols so people who believe they have discovered an AIS will know where to send a specimen, what parts of the specimen to send, and how to prepare the specimen for shipment. An integrated database must be created for this information and must be accessible to agency staff and to interested citizens. In addition, Michigan should identify specific taxonomic experts who can handle specimens of potential AIS to ensure species will be properly identified and verified. One way to accomplish this may be to expand and further fund the Great Lakes Aquatic Non-indigenous Species Information System database, which already has abstracts available for many of the invasive vascular plants found in the Great Lakes ([http://www.glerl.noaa.gov/res/Programs/ncrais/search\\_notes.html](http://www.glerl.noaa.gov/res/Programs/ncrais/search_notes.html)) or to use the U.S. Geological Survey Web site for new invasives <http://biology.usgs.gov/invasive/>, which has a number of invasive species mapping initiatives occurring in other states.
- G. Michigan should allocate funding to implement a system of enhanced monitoring and ecological surveys related to AIS in Michigan. All monitoring procedures must be continuously reviewed and audited and adaptive management should be used to continuously improve procedures.
- H. Michigan should better document and quantify the economic impacts of AIS for Michigan decision makers (dollar figures plus local case studies) as well as environmental impacts
- I. Michigan should support research to develop and implement new control methods for uncontrolled species of concern.
- J. Michigan should continue AIS-focused Hazard Analysis and Critical Control Point (HACCP) training and plan implementation for research and management agencies.
- K. State agencies, academic institutions, and other organizations should develop a strategy to identify means to secure funding support to conduct and evaluate cost-effective AIS vector-specific outreach and education programs such as programs targeting boaters and anglers (e.g., Clean Boats, Clean Waters). These programs should focus on behavior change and responsibility of resource users.
- L. Michigan should encourage and recruit a champion/lead organization for a volunteer coalition of stakeholders on AIS prevention and control to enhance state AIS education and outreach and monitoring. For example, riparians, anglers, Great Lakes shoreline property owners and other groups who are the most likely to spot new AIS must be educated and trained to advance AIS monitoring efforts, as well as, education and outreach efforts.
- M. Michigan should develop a comprehensive AIS Organisms-in-Trade educational campaign, including the bait industry in coordination with the Sea Grant AIS-HACCP and Pet Industry Joint Advisory Council/Sea Grant/U.S. Fish and Wildlife Service (USFWS) Habitattitude campaigns.



- N. Michigan should support a program that educates all facets of the Great Lakes maritime commerce industry, including ports, carriers, shippers, mariners, resource users and users of goods produced from cargoes transported to and from the Great Lakes by ships, about the urgency and cost-effectiveness of preventing/containing AIS, the status of prevention, and what is needed to advance prevention.
- O. Michigan should identify and develop environmentally safe biological agents that can be employed to control invasive species.
- P. Michigan should identify and map areas of significant invasive species concentrations to inform management decisions.

#### **RECOMMENDATIONS NEEDING CONGRESSIONAL OR FEDERAL AGENCY ACTION**

- A. Michigan should work with the Great Lakes Congressional Delegation in support of immediate effective and timely federal legislation for control of AIS in ballast water of all ships.
- B. Michigan should encourage development of a federal screening tool for species prior to importation to the United States and until an effective process is in place, the USFWS should continue to list AIS as injurious species under the Lacey Act.
- C. Michigan should work with the Great Lakes Congressional delegation to support passage of comprehensive legislation for prevention and control, including increased allocation of funds for development and implementation of state and interstate Aquatic Nuisance Species management plans through the Aquatic Nuisance Species Task Force (ANSTF), with a particular emphasis on the immediate use of techniques to control or slow the spread of AIS.
- D. Michigan should work with the Great Lakes Great Lakes Congressional delegation in support of the Great Lakes Commission's Legislative Priorities for Fiscal Year (FY) 2009 that are of importance to Michigan, including:
  - Funding be appropriated to the United States Army Corps of Engineers (USACE) to complete construction and operation of the dispersal barrier system in the Chicago Sanitary and Ship Canal and also for the authorized study on hydrologic separation of the Great Lakes from the Mississippi River Basin.
  - Increase funding to current AIS prevention and control programs, including:
    - a) \$11.25 million for the Section 1101 program to prevent the introduction and spread of AIS from vessels, including \$6 million to United States Coast Guard, \$2.5 million to USEPA, \$2.75 million to the ANSTF, \$1.5 million to USFWS and \$1.25 million to NOAA.
    - b) \$1 million to USFWS to support the six regional AIS panels under the ANSTF.
    - c) \$8 million to USFWS to support state-specific AIS management plans.
    - d) \$1 million to support model regional, state and local rapid response contingency strategies.
    - e) \$22 million to implement the Sea Lamprey Control Program.

## RECOMMENDATIONS NEEDING MICHIGAN LEGISLATIVE ACTION

- A. Michigan state agencies should work collaboratively with all interested parties, including the Legislature and executive offices, to develop a long-term funding source and sustainable program for AIS prevention and control actions.
- B. Michigan state agencies should work with the Legislature to increase funding within the MDNR and the MDA for the education, enforcement and monitoring of the bait industry, aquaculture facilities, and the ornamental fish and plant trade to ensure adequate monitoring of all species that may eventually find their way to the waters of the state.

### AIS Funding

Even though Michigan has a federally-approved state management plan for AIS prevention and control, Michigan has limited dedicated funding for this activity (except for the inland lakes Aquatic Nuisance Control permitting program). Limited general funds or specific dedicated funds are appropriated in Michigan, other than to authorize the inland lake permit program and to match limited federally funded projects. By contrast, our Great Lakes neighboring states have a variety of dedicated funding sources for AIS prevention and control. For example:

- Wisconsin has committed a portion of the motor fuel tax attributed to boat usage for an AIS program with a budget of \$4.3 million in FY2009. These funds are used for prevention, control, enforcement, and education programs.
- Minnesota funding for AIS activities, approximated \$2 million annually, is derived from a surcharge on watercraft licenses, a surcharge on non-resident fishing licenses, and the state's general fund.
- New York funds an AIS program with a portion of their Environmental Protection Fund, the source of which is a real estate transfer tax. Four full-time staff are supported, who implement a strong program of control and prevention.

These three example states, as well as other Great Lakes states, also use significant other state and federal funds for projects supporting their AIS programs.

# *Habitat/Species*

## **BACKGROUND**

With nearly 4,000 miles of Great Lakes shore, Michigan has the longest coastline of any state in the contiguous United States. Seventy major watersheds drain through 36,000 miles of rivers and tributaries. Michigan's shores are home to Pictured Rocks National Lakeshore and Sleeping Bear National Lakeshore, Isle Royale National Park, and the Thunder Bay National Marine Preserve and Underwater Sanctuary. Michigan's vast resources also include nearly 600 islands, over 60 shoreline state parks, more than 50 state wildlife, game or wildlife research areas, and numerous county and township parks. In addition, Michigan's shoreline holds all the state's commercial and recreational harbors, more than 35 ports; the United States side of the Detroit River International Wildlife Refuge, several federal wildlife refuges, all of the state's designated Environmental Areas (EA), critical dunes, and parts of several state and national forests.

The terrestrial and aquatic ecosystems in Michigan's Great Lakes Basin have been altered due to human development and activity, resulting in the loss or degradation of many natural communities, threatening the ecosystem and the species they support. Key threats include:

- loss of habitats in the highly productive nearshore and coastal zone as a result of development, boating and shipping activity, shoreline hardening and water quality degradation.
- disruption of sediment transport and other coastal processes.
- contaminant releases and continual uptake by fish and wildlife.
- loss of wetlands, floodplains and riparian buffers.
- habitat fragmentation affecting both terrestrial and aquatic organisms as a result of dam construction and other manmade barriers.

Michigan has lost approximately half of its original wetlands. Other important community types such as savannah, lakeplain prairies, critical and wooded dunes and swale complexes have also been heavily impacted. Changes in community type, patch size, and distribution have contributed to numerous plant and animal extirpations throughout the Great Lakes Basin.

These impacts directly affect human health, economic vitality and sustainability, and regional prosperity, as well as the biodiversity of Great Lakes wildlife, fish, and plant species and their habitats. Natural ecological processes contribute to the social and economic stability of the region and the nation. Millions of people depend on the Great Lakes and inland freshwater sources for water supplies for consumption, manufacturing, transportation, power generation and recreation. Current estimates indicate that boating, fishing, hunting, and wildlife watching generate significant economic activity annually and support thousands of jobs in Michigan's tourism industry. Healthy and diverse Great Lakes ecosystems are also of great value to the tribal nations who rely on these resources to meet their subsistence, economic, cultural, spiritual, and medicinal needs.

The causes and impacts of species loss and habitat degradation are many and transcend state boundaries. Unfortunately, the degradation of Michigan's coastal communities is difficult to quantify due to the lack of a consistent, ongoing, science-based inventory and monitoring program. The benefits of Great Lakes protection and restoration efforts extend far beyond Michigan. Successful campaigns for the protection and restoration of the Great Lakes ecosystem requires substantial financial resources, the talents of a broad range of stakeholders, and coordination among local, state, tribal, federal, and international agencies. In addition, successful protection of ecosystem components, particularly plant communities and the species they support will require the education of landowners, since more than 80 percent of these important resources are privately held.

Numerous policies, regulations, and ongoing management efforts in Michigan have been developed to address these issues. However, funding levels are insufficient to make improvements that are needed now. Michigan's environmental protection and resource restoration activities have demonstrated that smaller successes can be achieved at modest levels of effort. Budget constraints at the state level limit the capacity to execute existing authorities and to implement needed restoration initiatives. A coordinated, concentrated effort, at a broader scale, with a focus on the initial priorities for protection and restoration efforts, will help to address impacts to Great Lakes ecosystem health.

## SUCCESS STORIES

**Coastal and Estuarine Land Conservation Program (CELCP)** - With the launch of a new coastal habitat acquisition program, Michigan has taken a great stride toward the GLRC Strategy's goal of "enhancing fish and wildlife by restoring and protecting habitats and coastal wetlands." The new CELCP is a long-awaited addition to the Michigan Coastal Management Program's suite of resources available to address coastal habitat loss and fragmentation. Congress established the CELCP in 2002, to help states acquire coastal lands or interest in lands with significant conservation, recreation, ecological, historic, or aesthetic values. Lands with significant ecological value are Michigan's highest priority for protection. The NOAA administers the program at the federal level, and selects land acquisition proposals nominated by coastal states to compete for federal cost-share funds. Congress appropriated funding for the competitive grants for the first time in 2007.

A large parcel of land on the Keweenaw Peninsula will be Michigan's first acquisition made through this nationally competitive program. Michigan has received a \$927,000 grant for acquiring the Seven-Mile Point property on Lake Superior. The 120-acre property includes 2,000 feet of Great Lakes shoreline, globally-rare basalt bedrock beach, wooded ridges and swales, endangered species habitat, and a bedrock near-shore aquatic system. The addition of this property to the Gratiot River Watershed and Lake Superior Coastal Conservation Area will increase this conservation area to 4,090 acres and almost four miles of shoreline.

**Saginaw Bay to Lake Erie Coastal Habitat Project** - Ducks Unlimited has received a sixth North America Wetlands Conservation Act (NAWCA) grant for the Saginaw Bay to Lake Erie Coastal Habitat Project. This project secured \$1 million of federal dollars to conserve habitat in an 18-county area that includes the coastal counties along Saginaw Bay and the watershed counties of Lake St. Clair and western Lake Erie. This effort drew support from one of the largest and most diverse set of conservation partners yet to participate in a NAWCA grant in Michigan, including 17 state, federal, corporate and non-profit

organizations. These partners together pledged more than \$2.4 million in matching funds toward this project that, when pooled with the grant dollars, will result in the conservation of more than 3,800 acres of wetlands and associated uplands.

Key acquisition projects planned under this grant include the permanent protection of 102 acres of coastal wetlands and lakeplain prairie along Saginaw Bay and the expansion of the Detroit River International Wildlife Refuge. Wetland and grassland restoration and enhancement projects are planned for the Shiawassee River State Game Area, St. Clair Flats Wildlife Area, Fish Point Wildlife Area, Quanicassee Wildlife Area, Bay City Recreation Area, Shiawassee National Wildlife Refuge, land owned by Detroit Edison along Lake Erie and on private lands throughout the 18-county project area.

### **MICHIGAN SPECIES MANAGEMENT AND HABITAT PROTECTION GOAL**

Conserve, enhance and restore Michigan's fish and wildlife by restoring and protecting natural communities, the diverse habitats they provide and the ecological processes that sustain them.

### **RECOMMENDATIONS THAT CAN BE ACCOMPLISHED WITHIN EXISTING FUNDING CONSTRAINTS THROUGH INCREASED COLLABORATION**

It should be noted that Michigan currently has limited funding for the efforts identified below; however, if the habitat and species goal is to be achieved, continuation of existing programmatic funding is essential.

- A. Michigan should continue to evaluate wetland protection methods and explore opportunities to work with other agencies to protect these investments.
- B. Michigan should continue to improve and expand coordination and funding opportunities through the Michigan Wetland Working Group to accelerate wetland restoration efforts and achieve wetland restoration goals. Recently, through the North American Wetlands Conservation Act Joint Ventures, federal partners have contributed \$3.5 million with Michigan partners investing over \$17 million towards habitat protection and restoration efforts.
- C. When wetland mitigation is necessary, the MDEQ should make connections between regulatory actions and mitigation efforts to improve restoration efforts, including partnering with land conservancies and land trust to identify potential mitigation sites.
- D. Michigan should complete the update of the National Wetland Inventory (NWI) data using 1998 and 2005 aerial imagery. This project is currently in progress.
- E. Michigan should continue designation of critical non-contiguous wetlands on public lands.
- F. Michigan should work with the USEPA to mandate incorporation of wetland Best Management Practices (BMP) into watershed planning and implementation efforts.
- G. To cover a wider area of shoreline and reduce the cost of monitoring, the MDEQ should coordinate with regional non-profit groups willing to take on local annual monitoring programs.

- H. To ensure protection and management of the natural coastal communities (i.e. coastal wetlands, dunes, bedrock shorelines, etc.) and the processes that sustains them (i.e., sediment transport, lake-level fluctuation, wetland migration, etc.) Michigan should permanently protect 500 acres of high priority coastal communities per year using funding from the CELCP, Coastal Zone Management Program, and the National Coastal Wetland Conservation Program, as well as other sources.
- I. Michigan should utilize the priority system established in CELCP plan to ensure all state funded coastal protection projects meet Michigan's protection priorities.
- J. Michigan should continue to develop landowner education materials, including a Best Management Practices (BMPs) manual for property owners in designated Critical Dune Areas, to encourage the protection of important shoreline resources.
- K. Michigan should continue collaborations between federal, state, local and non-governmental organizations on land protection, land acquisition, and establishment of easements.
- L. Michigan should develop a prioritization system for land acquisition and habitat and species protection and restoration efforts, including consideration for high quality streams and areas of great biological significance, for local, regional and statewide planning and management efforts.
- M. Michigan should build capacity and improve effectiveness of land protection efforts by partnering with nongovernmental organizations such as local land trusts, conservancies, and watershed councils.
- N. Michigan should collaborate with stakeholders under the Great Lakes Basin Fish Habitat Plan to prioritize protection and restoration efforts throughout the Great Lakes.
- O. Michigan should promote closure of non-essential resource management roads and seek other road closure opportunities that do not conflict with appropriate uses.
- P. To restore habitat connectivity and minimize fragmentation of terrestrial and aquatic environments, Michigan should:
  - Incorporate identified areas of great biological significance into local, regional and statewide planning and management efforts.
  - Improve coordination between natural resource conservation organizations, land trusts, and transportation planners at local, regional and statewide scales, particularly when prioritizing projects. In addition, Michigan should also improve collection, analysis and access of data used for local, regional and statewide land-use and transportation planning to better assess and evaluate projects and programs.
  - Incorporate BMPs in construction, repair and replacement of stream crossings.
- Q. To reconnect key tributaries to the Great Lakes, Michigan should encourage the voluntary removal of dams where they serve little or no purpose and there is a reasonable expectation that removal will improve overall ecological function and improve the health of aquatic resources. These efforts should include:
  - Tracking dam location and function for use in providing recommendations for dam retention or removal.
  - Consider developing a prioritization tool for dam removal and river restoration, including fisheries management.
  - Consider developing a river restoration team comprised of representatives from the MDEQ and the MDNR that could facilitate outreach and information exchange for dam owners wishing to remove a dam.

- Assisting local communities in assessment of dams as part of a comprehensive watershed management and recreational planning. Develop and expand partnerships with nonprofit organizations and foundations to maximize distribution of information and leverage resources for river restoration and dam removal.
  - Continuing to disseminate information on dam removal as part of routine dam safety correspondence.
  - Continuing to develop, test, and encourage dam operations that mimic natural riverine conditions and temperatures, protect and maintain desired aquatic communities, protect recreational uses, and, where possible, rehabilitate natural resources degraded by the dam.
  - Research on the effects of timing and duration of impoundment drawdowns is needed to help minimize adverse effects to wildlife species that use impounded areas.
- R. Michigan should take steps necessary to preserve natural stream structure and function to promote healthy aquatic and terrestrial environments particularly in high quality streams. Where stream channels are modified or subject to restoration efforts, efforts to incorporate natural stream channel stability in engineered drainage channels, maintain or establish buffers, and mimic natural channel dimension, pattern and profile should be encouraged. Also, artificial techniques and engineering of new structures that mimic natural processes should be developed.
- S. To maintain, enhance and rehabilitate self-sustaining species populations, Michigan should take steps necessary to conserve natural communities that provide habitats of high ecological significance across the state, with a special emphasis on developing and implementing recovery plans for endangered species.
- T. To conserve natural communities or locations that provide critical habitats for rare, threatened or endangered species and rare or unique communities, such as dunes and islands, Michigan should continue to implement Michigan's Wildlife Action Plan, including activities such as:
- Integrating current information regarding unique landscape communities, including unique aquatic habitat types;
  - Identifying priority habitats statewide and regionally for the conservation of biodiversity to aid in the identification of priority areas for future conservation and protection measures;
  - Fostering existing partnerships and creating new partnerships between conservation organizations/agencies and private landowners for conservation of wildlife and landscape features through programs such as the DNR's Landowner Incentive Program; and
  - Educating the public about primary threats to wildlife and natural features, biodiversity and essential ecological processes.
- U. Michigan should continue to develop and evaluate lake trout restoration efforts using guidance from existing fishery management plans.
- V. Michigan should continue to assess factors involved in recruitment of lake trout and other important native species, and remove or mitigate impediments to recruitment.
- W. Michigan should continue restoration efforts to re-establish lake sturgeon in the areas where they have been extirpated from the Great Lakes by implementing recommendations in the Lake Sturgeon Rehabilitation Strategy. Restoration efforts should also be implemented to re-establish coregonines in areas where they have been extirpated.
- X. To restore key fish species populations such as lake trout and brook trout, Michigan should implement actions identified in the National Fish Habitat Action Plan (e.g., improving road crossings, implementing BMPs, and addressing repair of perched culverts).
- Y. Michigan should continue funding habitat and species research to address information needs of natural resource agencies.

## RECOMMENDATIONS NEEDING ADDITIONAL FUNDING TO ACCOMPLISH

It should be noted that Michigan may have limited funding for some of the efforts identified below; however, if the habitat and species goal is to be achieved, significant new resources will be essential.

- A. Currently, Michigan is restoring approximately 4,000 acres of wetland per year. Michigan should restore 500,000 acres of wetlands (10 percent of historic losses) and establish up to 1,000,000 acres of associated upland grassland buffers around the restored wetlands at a rate of 2 to 1 ratio (e.g., 2 acres upland to 1 acre wetland) by 2079, which will be the 100-year anniversary of Michigan's Wetland Protection Statute. Within the next 3 years, Michigan should restore 18,000 acres of wetlands and establish up to 36,000 acres of associated upland grassland buffers around the restored wetlands. Achieving this 3-year goal will require a 50 percent increase (6,525 acres per year) in Michigan's current rate of wetland restoration under the Wetland Reserve Program (WRP), Conservation Reserve Enhancement Program (CREP) and the Partners for Fish and Wildlife Program. Michigan should take full advantage of the Farm Bill programs and other USDA conservation programs to address working lands resource concerns that impact all wetlands (both restored and intact). Additionally, the USDA Environmental Quality Incentives Program (EQIP), Wildlife Habitat Incentives Program, Continuous Conservation Reserve Program (CRP) should be used to assist in protecting wetlands through establishment of conservation measures and in the case of Continuous CRP, restoration of wetlands.
- B. Michigan should permanently protect 50,000 acres of high quality wetlands and 100,000 acres of associated upland buffers at a rate of at least 1,000 acres of high quality wetland and 2,000 acres of associated upland per year through the establishment of conservation easements or fee simple purchase.
- C. Michigan should take steps to restore critical fisheries by restoring armored shoreline areas into bayous and marshes which are a major inhibitor to healthy rivers and streams.
- D. Michigan should expand, strengthen, and increase capacity of its Natural Rivers Program, including designation of additional Natural Rivers and adopting a revised set of natural river administrative rules that would standardize the administrative process and consolidate existing and future administrative rules.
- E. Michigan should take steps to enhance the state's partnership with the federal Farm Service Agency's (FSA) CREP by:
  - Completing Michigan's current CREP agreement which calls for a total of 85,000 acres of conservation practices to enhance water quality and wildlife habitat; and
  - Working with the FSA to expand areas of Michigan eligible for this funding. Currently, CREP is limited to the Saginaw Bay watershed, the Lake Macatawa watershed, the River Raisin watershed, and several small watersheds in the western Lake Erie Basin.
- F. To better evaluate and track the success of wetland restoration programs, Michigan's Wetland Working Group should create a restoration tracking system. This tracking system must be limited to information that does not violate federal Farm Bill privacy provisions (i.e. limited to acreage of wetlands restored, town, range and section information, etc.) to protect the interests of private landowners.
- G. To ensure wetland conditions throughout the state are sufficient to provide a full range of ecosystem services, including hydrological retention, nutrient and sediment trapping, the provision of spawning, nesting, nursery, and other habitat needs of fish and wildlife and to ensure that the state



can adequately and accurately gauge the status and trends in wetland condition throughout the state, Michigan should develop a statewide systematic monitoring and inventory program to assess wetland quality by incorporating the evaluation of wetlands into routine Basin-wide water quality monitoring. This action is further defined in the Indicators and Information section of this report.

- H. Michigan should secure long-term, stable funding to implement the Great Lakes Coastal Wetland Consortium's long-term coastal wetland monitoring program.
- I. Michigan should ensure that natural coastal communities (i.e. coastal wetlands, dunes, bedrock shorelines, etc.) and the processes that sustain them (sediment transport, lake-level fluctuation, wetland migration, etc.) are protected and managed and that coastal communities sustain diverse and abundant populations of native resident and migratory fish and wildlife species. This effort should include:
  - Completing a statewide inventory of shoreline type, erosion rates, and shore protection structures along Michigan's Great Lakes shoreline, and implement a plan to track future changes in the length of the structured shoreline.
  - Conducting a statewide assessment of existing critical dune areas to inventory historic land use changes and associated impacts in the regulated dune areas and to prioritize dune areas to be protected through acquisition.
  - Completing development of the delisting targets for those AOCs that have Beneficial Use Impairments (BUIs) for the "Loss of Fish and Wildlife Habitat" and "Degraded Fish and Wildlife Populations" and initiate restoration efforts to address and remove these BUIs.
- J. Michigan should re-establish the EA program within the MDEQ, Land and Water Management Division (LWMD) so that designated high quality areas can be adequately monitored, protected and restored and revisit the rest of Michigan's shoreline to determine if designation of new EAs at additional locations is appropriate.
- K. Michigan should develop a statewide strategy to reduce or eliminate the construction of new shoreline protection structures along Michigan's Great Lakes shorelines, thereby encouraging healthy and naturally protective beach environments. Where shoreline modifications or reconstruction are determined to be in the public interest, designs should incorporate mitigation measures to the extent practical to minimize negative impacts and restore/create habitat.
- L. Michigan should coordinate with the USACE – Detroit District regarding the regional sediment management demonstration project and Section 111 efforts in an attempt to realize 100 percent bypass rates at harbor navigation structures.
- M. To restore habitat connectivity and minimize fragmentation of terrestrial and aquatic environments, Michigan should implement statewide land-use goals identified in Michigan's Land, Michigan's Future: Final Report. This effort should include:
  - Initiating local, regional, and statewide ecosystem planning efforts that encourage retention of larger natural landscape components, promote establishment of vegetated corridors between landscape fragments, and coordinate management of adjacent public and private lands.
  - Incorporating passage facilities at dams to increase movement of aquatic organisms.
  - Promoting policies and requirements for drainage and channel modification practices that restore stream form, function, and continuity and ensure that aquatic organism passage is maintained.
  - Implementing provisions of the Biological Diversity Act, Part 355 of the Natural Resources and Environmental Protection Act (Act 451, PA 1994), including the requirement for interdepartmental coordination.
  - Address thermal pollution issues to eliminate or minimize fragmentation in aquatic ecosystems.

- Updating and continuing distribution of *Filling the Gaps: Environmental Protection Options for Local Governments* to local, regional and statewide planning efforts.
- N. Michigan should secure funding for long-term monitoring to obtain data that can be used to assess and evaluate projects and develop approaches for adaptive management.
- O. Michigan should recognize the need to plan for and monitor impacts of climate change (e.g., the northward migration of species and changes in migration patterns and corridors, alteration of aquatic habitat and the potential value of buffer zones to increase resiliency).
- P. Michigan should develop a statewide strategy to address invasive species that identifies, develops, promotes, and implements management techniques (e.g., prescribed burning, pesticides, and water control) to control or eliminate invasive species and deter invasive species establishment and spread. Restoration plans for sites where invasive species have been controlled should be developed.
- Q. To preserve natural stream structure and function to promote healthy aquatic environments, Michigan should develop and adopt standard culvert design parameters that have proven effective in passing channel-forming flow events and protect the ecological and hydrologic integrity of the stream. Michigan should take steps to restore and improve culvert design for pristine and high quality rivers and streams.
- R. Michigan should continue to implement Michigan's Wildlife Action Plan to conserve biodiversity of the state and advance actions such as:
- Developing survey, monitoring and response protocols to identify and address new disease, pathogens, and invasive species;
  - Conducting additional surveys and research to fill knowledge gaps about species distribution, population status, habitat use, other general life history information and threats. Priority needs for fish include identification of spawning habitat and movement information.
- S. Michigan should accelerate efforts to map the distribution of mussel beds in Michigan in order to provide additional protection to these species, including reviewing and improving procedures to ensure consideration of, and avoidance of, known mussel beds through construction, dredging and other activities, and developing BMPs for mussel rescue and relocation, including post-construction monitoring for survival.

## **RECOMMENDATIONS NEEDING CONGRESSIONAL OR FEDERAL AGENCY ACTION**

- A. Michigan should work with the Great Lakes Congressional Delegation to secure funding state implementation of the Clean Water Act Section 404 wetlands protection program within the MDEQ.
- B. Michigan should continue to update the NWI in 10-year intervals to monitor long-term wetland trends.
- C. Michigan should also encourage federal support of increased funding for species and habitat restoration.
- D. Michigan should work with the Great Lakes Congressional Delegation to ensure that conservation portions of the Farm Bill are maintained in the reauthorization.
- E. Michigan should work with the Great Lakes Congressional Delegation to initiate and support the following actions from the GLRC Strategy:
- Provide \$20 million additional dollars annually for efforts to promote the protection and restoration of native fish communities in the near shore and open lake waters.
  - Provide \$188.7 million annually to achieve the goals of the Great Lakes regions specified in the North American Waterfowl Plan and related joint ventures. Specifically, target \$57 million new dollars annually for acquisition, restoration, and other protection tools for wetlands.

- Pass legislation to authorize a Great Lakes Rivers Act and provide \$40 million annually to implement watershed projects that restore hydrology, protect and restore riparian habitats for wildlife, restore in-stream habitats needed for fish spawning or nursery sites, and promote access for fish migrations while restricting invasive species expansion.
- F. Provide \$40 million annually to create a coastal shore and upland habitat conservation program to coordinate funding to ensure that Great Lakes native species and communities of greatest conservation need are protected, restored, and appropriately managed. It is further recommended that an increase in funding for existing Coastal and Estuarine Land Conservation Program, USFWS landowner incentive program and Partner for Wildlife Program to encourage private and corporate landowners to conserve habitat and help to protect important native species be considered.
- G. Reauthorize and fully fund the new Coastal Zone Management Act (CZMA) for Great Lakes and coastal protection and management programs.
- H. Michigan should work with the Great Lakes Delegation in support of the Great Lakes Commission's Legislative Priorities for FY 2009 that are of importance to Michigan, including:
- Appropriate \$16 million to USFWS under the Great Lakes Fish and Wildlife Restoration Act for grants to states, tribes and local governments to encourage cooperative conservation, restoration and management of fish and wildlife resources and habitat.
- I. Michigan should work with the Great Lakes Congressional Delegation in support of the GLRC, Great Lakes Restoration and Protection Near-Term Action Items for Federal Fiscal Year (FFY) 2009, including:
- Appropriate \$28.5 million to restore 200,000 acres of wetlands, toward the GLRC Strategy's goal of eventual restoration of 550,000 acres. (States, local governments and nongovernmental organizations would raise an additional \$28.5 million in nonfederal matching funds.)
  - Continued efforts by the Federal Interagency Task Force to review all federal agencies' wetland management programs and develop a consolidated approach.
- H. Michigan should work with the Great Lakes Congressional Delegation to achieve passage of the Clean Water Restoration Act.
- I. Michigan should work with the Great Lakes Congressional Delegation in support of continued and increased funding to state fish and wildlife agencies for wildlife conservation and related recreation and education.
- The Wildlife Conservation and Restoration Program (WCRP) was created by Congress in 2000 to provide funding to state fish and wildlife agencies for wildlife conservation and related recreation and education. However, this program is not currently receiving any funding.
  - The Teaming with Wildlife Act is proposed to provide a reliable and increased amount of funding for preventing wildlife from becoming endangered. This bill would dedicate a portion of existing federal revenue from on-shore and off-shore oil and mineral development activities to the WCRP.

## **RECOMMENDATIONS NEEDING MICHIGAN LEGISLATIVE ACTION**

- A. Michigan should develop a long-term funding proposal to secure state funding for species and habitat conservation and restoration under existing management plans.
- B. Michigan should secure long-term, stable funding to implement the Great Lakes Coastal Wetland Consortium's long-term coastal wetland monitoring program.

- C. The Michigan Legislature should secure long-term stable funding to Michigan Conservation Districts in order to adequately deliver conservation and restoration programs.
- D. Upon the expiration of the current CREP agreement, Michigan should appropriate funds to maximize access to the available federal dollars associated with the program.
- E. The MDEQ should secure long-term stable funding for wetlands and lakes and streams regulatory programs, including monitoring to enable programs to more fully protect Michigan's Great Lakes resources.
- F. The Michigan Legislature should develop and pass Transfer of Development Rights legislation to support and encourage regional land-use planning.
- G. The Michigan Legislature should develop new regulations/legislation to protect species of greatest conservation need and vulnerable natural features.

# *Coastal Health*

## **BACKGROUND**

Potential sources of pathogens impacting recreational water and drinking water in the Great Lakes are the result of both direct and indirect contamination sources. Research has found that primary sources of contamination vary widely by beach and that most sources are local in nature. Sources of concern include:

- Stormwater discharge from nearby outfalls,
- Direct runoff from roads and parking lots,
- Domestic and wild animal waste,
- Malfunctioning septic systems,
- Illegal sewer connections,
- Illegal dumping from marine vessel holding tanks,
- Avian and other animal populations on beaches, and
- Sanitary sewer overflows (SSOs) and CSOs.

Excessive algal growth in the Great Lakes has been a nuisance and a potential source of toxins which had largely disappeared in the late 1970's; however, it has now reemerged. NPS and inadequately-treated-wastes are the major causes of nutrient enrichment of nearshore waters. Both urban and rural NPS are contributing a wide variety of pollutants which are collected by the tributaries and discharged into the Great Lakes, streams and rivers. In addition, the impact of invasive species such as quagga mussels, zebra mussels and round gobies are disrupting the nutrient cycling in the nearshore areas of the lakes.

## **SUCCESS STORIES**

**Beach Monitoring by Local Health Departments** - Michigan has 604 public beaches stretching along 545 miles of Great Lakes shoreline. Since 2005, the MDEQ has distributed over \$1 million of federal Beaches Environmental Assessment and Coastal Health Act funds to help local health departments monitor 200 high priority beaches. An average of 97 percent of the samples collected each year from monitored beaches indicated that water quality standards for safe swimming are being met. Results from the past five years show that 15 percent of the monitored beaches reported beach closures due to elevated levels of *E. coli*. While most of Michigan's beaches are extremely clean and water quality is excellent, improvements still need to be made to eliminate pollution sources which can cause closings in some areas. All beaches, their current status (open or closed), and *E. coli* test results are provided on the MDEQ's Beach Monitoring Web site which allows interested individuals to automatically receive the latest updates on beach closures and advisories.

When bacterial contamination is found to affect the quality of water at a beach, the MDEQ and local health departments are using a new beach sanitary survey tool to determine sources of the contamination. The beach sanitary survey tool can be used to develop a forecasting model for a beach that can, in turn, be used to predict current water quality conditions. With the ability to forecast the quality of the water at a beach, Michigan can better protect public health.

**Mason Township Rapid River Wastewater Improvement Project** - Failing septic tanks and contaminated drinking water wells in Masonville Township near Bay de Noc were a documented problem for many decades. The failing septic systems were contributing to increased contamination of private drinking water wells, contamination of the groundwater, and nutrient loading to the surface waters of Bay de Noc. In 2001, Masonville Township received a \$1 million Clean Michigan Initiative bond (CMI) Clean Water Fund grant from the MDEQ Non Point Source Program for the Rapid River Wastewater Improvement Project. The Township installed a public wastewater collection system which eliminated 170 failing on-site septic systems. This project resulted in the reduction of 14.8 tons of sediment, 876 pounds of phosphorous, and 2,695 pounds of nitrogen per year. Leveraging available funding from the USDA Rural Development and Michigan Economic Development Corporation, the township provided almost \$6 million in matching funds to aid in completion of this project in 2007.

## **MICHIGAN'S COASTAL HEALTH GOAL**

Protect public health through the elimination of pollution sources which can cause closings at beaches due to bacterial contamination to enhance recreation opportunities and support a strong and vibrant Michigan economy.

### **RECOMMENDATIONS THAT CAN BE ACCOMPLISHED WITHIN EXISTING FUNDING CONSTRAINTS THROUGH INCREASED COLLABORATION**

It should be noted that Michigan currently has limited funding for the efforts identified below; however, if the coastal health goal is to be achieved, continuation of existing programmatic funding is essential.

- A. State and local public health agencies should provide public education and/or incentives to reduce impacts from nutrient loading and bather shedding. Michigan should provide information to the public through local signage ordinances and other media at beaches, including:
- Bacteria levels present in natural waters in quantities that may or may not cause a health problem;
  - The risk for illness when there is a beach closure;
  - The risk of feeding waterfowl, which can increase avian waste at beaches;
  - The importance of observing general sanitary practices such as hand washing and staying out of the water when having gastrointestinal illness;
  - The importance of proper boat waste disposal; and
  - The importance of proper pet waste disposal.

- B. Michigan should continue to work with local agencies and encourage the use of beach sanitary surveys to identify unknown pollution sources that cause beach closures.
- C. Michigan should partner to develop, evaluate and perform trial runs technologies that provide real-time testing methodologies for assessing bacteriological contamination to manage recreational water.
- D. Michigan should develop a communication strategy focusing on cultural stewardship by involving communities to educate the public about individual actions that can be taken and changes in land use practices that will ultimately benefit coastal health (e.g., Wet Weather days modeled after Ozone Action Days – Don't wash on a wet day.)
- E. Michigan should continue to expand collaborative efforts with local authorities and the MDEQ support as necessary, to require corrective action, including necessary enforcement action, to address all identified sources of contamination.
- F. Michigan should continue to prioritize the protection of drinking water using existing programs and identify and reduce vulnerability of source water for drinking water through surface water assessments.
- G. Michigan should promote research among academia, government, and industry to develop and test methodologies to test for the presence of indicator bacteria and pathogens.
- H. Michigan should adopt recommendations from the Michigan Land Use Leadership Council where applicable.

#### **RECOMMENDATIONS NEEDING ADDITIONAL FUNDING TO ACCOMPLISH**

It should be noted that Michigan may have limited funding for some of the efforts identified below; however, if the coastal health goal is to be achieved, significant increased funding is essential.

- A. Michigan should continue to investigate the causes and solutions for controlling excessive algal growth that can serve as potential sources of toxins and pathogens, and provide short-term guidance on nuisance algae beach clean up. Of significant importance is the need for research and monitoring to gain a better understanding of the relationship of avian botulism, invasive species, and nutrient levels in nearshore areas and to develop a communication strategy to educate the public about the human health issues.
- B. Michigan should aggressively pursue implementation of the Phosphorus Advisory Committee's recommendations such as increased public education, research, remediation, and enforcement to prevent indirect pollution sources from adversely impacting Great Lakes coastal health.
- C. Michigan should continue to provide financial assistance to local units of government through the State Revolving Fund and the Strategic Quality Initiatives Fund for the construction of infrastructure to eliminate and prevent the discharge of municipal wastewater that impacts the quality of Michigan's coastal waters.
- D. Michigan should fully implement, enforce, and report on wet weather control programs (e.g., stormwater, CSOs, SSOs, and NPS) to identify and correct deficiencies to ensure that the requirements of the federal Clean Water Act are achieved in a timely manner and to eliminate, to the extent provided by existing regulation, the inputs of untreated or inadequately-treated human and industrial waste and continue implementation of wet weather programs.

- E. Michigan should complete environmental inventories of both emerging pathogens and other pollutants that are comprehensive and include watersheds, wastewater inputs and drinking water withdrawals. From this inventory the sources, fates, and reduction strategies for these items of concern can be evaluated.
- F. Michigan should assess the extent of contaminated sediments especially in AOCs that contribute to water quality concerns.
- G. To better protect drinking water sources, Michigan should fund wellhead protection plans.
- H. Michigan should encourage the development of alternative financial mechanisms for local units of government to address stormwater runoff issues by clarifying the process by which local units of government can generate revenue for stormwater control.
- I. Michigan should implement a strategy to monitor emerging contaminants such as those on the Michigan Watch List, pharmaceuticals, and personal care products.

### **RECOMMENDATIONS NEEDING CONGRESSIONAL AND FEDERAL AGENCY ACTION**

- A. Michigan should work with the Great Lakes Congressional Delegation to insure appropriate and adequate funds are allocated for dredging and infrastructure improvements. The value and importance of maintaining appropriate water depths in Michigan's commercial deep draft and recreational shallow draft harbors, as well as harbor infrastructure maintenance and improvements are critical to providing access to water related commercial and recreational activities in coastal areas of the state.
- B. Michigan should work with the Great Lakes Congressional Delegation to initiate and support the following actions from GLRC Strategy:
  - New funding as part of a 55/45 percent federal/local cost share, in federal loans to support state and local resources to fund wastewater treatment improvements.
  - New funding to administer a new loan program to review and upgrade wet weather programs, including the CSO Control Policy, National Pollutant Discharge Elimination System permit issuance and enforcement, and storm water management to ensure that issues are addressed comprehensively and also implement anti-degradation rules in relation to sewage system expansions.
- C. Michigan should work with the Great Lakes Congressional Delegation in support of the Great Lakes Commission's Legislative Priorities for FY 2009 that are of importance to Michigan, including:
  - Increase current appropriations for the Beaches Environmental Assessment and Coastal Health (BEACH) Act to \$20 million nationwide, including \$3.8 million to Great Lakes states. Reauthorize the BEACH Act through 2012, with an increase in the authorized funding level to \$40 million and encourage USEPA to refine its formula for allocating funds under the Act to make it more equitable for states with longer coastlines and larger coastal populations.
  - Reauthorize and fully fund the CZMA at \$120 million nationwide for matching grants to support existing Great Lakes state Coastal Zone Management programs, which protect unique coastal resources, ensure adequate public access to the shore, and encourage coastal-dependent development that conserves natural features and avoids development in hazard areas. Appropriate \$60 million nationally for the Coastal and Estuarine Land Conservation Program (CELCP), administered through the CZMA, which provides competitive grants to protect wetlands and other coastal lands of unique value.



- D. Michigan should work with the Great Lakes Congressional Delegation in support of the Council of Great Lakes Governors' Great Lakes Restoration and Protection Near Term Action Items for FFY 2009, including:
- Ensuring that the federal government, in cooperation with the states, requires that all CSO/SSO communities have completed a long-term control plan within the next four years and are making adequate progress in implementing these plans.
  - Restoring the FY 2008 cut of \$394.7 million and, in addition, appropriating for FFY 2009 the historical full-funding of \$1.35 billion in support of this program.
  - Providing an additional \$2 million under the BEACH Act to enable Great Lakes states and tribes to standardize and implement a risk-based approach to beach/coastal assessment.
  - Maintaining current funding levels: \$1.75 million for the Great Lakes states and \$50,000 for eligible tribes.

### **RECOMMENDATIONS NEEDING MICHIGAN LEGISLATIVE ACTION**

- A. Pursue enactment of a statewide sanitary code, with the MDEQ oversight, to assure adequate and consistent placement of septic tank tile field systems and standards for minimum requirements for construction, siting, and maintenance of on-site disposal systems. The code should establish requirements for septic tank tile field inspections at the time of sale of the property and require county health departments to establish a regulatory structure to assure consistent statewide regulation of septic tank tile field systems, without pre-empting local control. In the interim, Michigan should support local agencies in the development and implementation of ordinances where septic systems are impacting water quality and instruct homeowners on proper maintenance practices, implementation of alternative treatment technologies and septic system ordinances.
- B. The Michigan Legislature should restore General Fund appropriations for required state-match in the State Revolving Loan Fund and ensure sale of Great Lakes Water Quality Bonds at the authorized rate to provide maximum and immediate capitalization to the State Revolving Loan Fund to provide assistance to local governments for infrastructure improvements to eliminate inputs of untreated or inadequately treated human and industrial waste.
- C. The Michigan Legislature should pass legislation providing long-term funding for:
- Drinking water infrastructure improvements and support source water protection,
  - Michigan Conservation Districts water source quality protection programming, and
  - Water quality and bacteriological monitoring.

# *Areas of Concern/Sediments*

## **BACKGROUND**

In 1987, amendments to the United States/Canada Great Lakes Water Quality Agreement (GLWQA) were adopted by the federal governments of the United States and Canada. Annex 2 of the GLWQA listed 14 different BUIs which are caused by a detrimental change in the chemical, physical, or biological integrity of the Great Lakes system. It directed the two countries to identify Areas of Concern (AOC) that did not meet the objectives of the GLWQA. Remedial Action Plans (RAPs) addressing the BUIs were to be prepared for all AOCs. The BUIs provided a tool for describing effects of the contamination and a means for focusing remedial actions. The scope of the AOC program is based on the concept that each area has had at least one BUI that is an extraordinary problem; one that sets the area apart from other sites with contamination in the state that are not designated as an AOC.

There are 14 AOCs in Michigan, with a total of 110 BUIs (see Table 1). Ten of the AOCs are completely within Michigan's borders (Kalamazoo River, Muskegon Lake, White Lake, Manistique River, Deer Lake, Torch Lake, Saginaw River/Bay, River Raisin, Rouge River, and Clinton River). Three (Detroit, St. Clair and St. Marys Rivers) are along the U.S. and Canadian border, and one AOC, Menominee River, is shared with Wisconsin. In the latter four AOCs, responsibility for restoring BUIs is shared among jurisdictions.

AOCs vary widely in geographic scope and extent of environmental problems. Some are confined to small harbors and others encompass an entire river watershed. Some are impacted primarily by one large contaminated sediment site and others face multiple sources of pollution and extensive loss of habitat. The most common sources of impairments are contaminated sediments, sewage treatment plant discharges and CSOs, NPS, runoff from hazardous waste sites, and habitat degradation and destruction.

Public involvement is a key component of the AOC program in Michigan. Each AOC has had significant input from a Public Advisory Committee, and the program has a Statewide Public Advisory Council consisting of members of individual councils. All are integral to the program.

Contaminated sediments are linked to impairments in all 31 United States AOCs, including all 14 Michigan AOCs. Many sediment dredging projects are constrained by the complexity and cost of design and implementation, limited alternatives to contaminated sediment dredging and disposal, limited disposal capacity, and challenges for beneficial re-use of some sediments. The Great Lakes Legacy Act has been a critical source of funding for remediation of contaminated sediment sites.

Full restoration of the Great Lakes AOCs would contribute significantly toward the overall goal of Great Lakes restoration and lead to benefits estimated at up to \$50 billion for the region. Progress on restoration of Michigan's AOCs is tracked by removal of BUIs. Details for BUIs in each AOC can be found at [www.epa.gov/glnpo/aoc/index.html](http://www.epa.gov/glnpo/aoc/index.html).

Table 1: Michigan AOCs-BUI Matrix.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total
Clinton River	X				X	X	X		X	X			X	X	8
Deer Lake	X			X			X								3
Detroit River	X	X	X	X	X	X		X	X	X			X	X	11
Kalamazoo River	X			X	X	X			X	X			X	X	8
Manistique River	X				R	X			X					X	5
Menominee River	X				X	X			X				X	X	6
Muskegon Lake	X				X	X	X	X	X	X			X	X	9
River Raisin	X			X	X	X	X		X	X			X	X	9
Rouge River	X		X		X	X	X		X	X			X	X	9
Saginaw Bay/River	X	X		X	X	X	X	X	X	X		X	X	X	12
St. Clair River	X	X		X	X	X		X	X	X	X			X	10
St. Marys River	X		X	X	X	X	X		X	X			X	X	10
Torch Lake	X		R		X										3
White Lake	X				X	X	X	X		X			X	X	8
1 = Restrictions on fish and wildlife consumption 2 = Tainting of fish and wildlife flavor 3 = Fish tumors or other deformities 4 = Bird or animal deformities or reproductive problems 5 = Degradation of benthos 6 = Restrictions on dredging activities 7 = Eutrophication or undesirable algae 8 = Restrictions on drinking water consumption or taste and odor problems								9 = Beach closings 10 = Degradation of aesthetics 11 = Added costs to agriculture or industry 12 = Degradation of phyto- or zooplankton populations 13 = Degradation of fish and wildlife populations 14 = Loss of fish and wildlife habitat R= Removed							

## SUCCESS STORIES

**20 Years of Progress towards Delisting Michigan's Great Lakes AOCs** - 2007 marked the 20th anniversary of the Amendments to the GLWQA that established the Great Lakes AOCs program. To restore the BUI in the AOCs, RAPs were developed and have been implemented. Significant progress has been made in that restoration effort. As restoration goes forward in the AOCs, the MDEQ is documenting that work. Michigan recently finalized guidance for formal removal of BUIs that have been restored and for delisting AOCs from which all BUIs have been removed. Three BUIs have already been removed and several others are under assessment for removal in Michigan's AOCs. Local public advisory councils and a Statewide Public Advisory Council are integral to the work by providing input and support necessary to make the investments in restoration.

**Making Progress by Removing Contaminated Sediment in Great Lakes AOCs** - In 1998, the citizens of Michigan made the quality of our environment a priority by passing the Clean Michigan Initiative (CMI) bond. As part of the CMI bond initiative, \$25 million was set aside for the investigation and remediation of contaminated sediments in Michigan lakes, rivers, and streams. In 2002, Congress passed the Great Lakes Legacy Act (Legacy Act) which provides funding for the clean-up of contaminated sediment in AOCs within the United States. By combining the CMI funding with the Legacy Act funding, Michigan has made great strides towards the remediation of contaminated sediments. These projects have been in addition to the important Superfund work completed or in progress in Michigan's AOCs. Projects recently completed include:

**Detroit River AOC** - In 2004, the MDEQ signed the first Great Lakes Legacy Act Project agreement with the USEPA for the remediation of sediments in the Black Lagoon, Trenton Channel, located in the Detroit River AOC. This project resulted in the removal of approximately 115,000 cubic yards of sediment contaminated with mercury, polychlorinated biphenyl, and oil and grease. In 2007, the Black Lagoon was renamed Ellias Cove and will be the future site of a marina. Without this project, the economic redevelopment in this portion of the Detroit River would not have been possible.

**Muskegon Lake AOC** – In 2006, the Ruddiman Creek project was completed with CMI bond monies and Legacy Act funds. This project resulted in the removal of approximately 95,000 cubic yards of sediments contaminated with cadmium, chromium, lead, and organic chemicals.

**St. Marys River AOC** - The Cannelton Industries, Inc. site, resulted from tannery operations between 1900 and 1958, which left contaminated sediments. Under an innovative cost-share agreement, the MDEQ, using CMI bond monies, worked with the USEPA and a private party to remove contaminated sediments from the St. Marys River. As a result of this action, the USEPA, in coordination with the MDEQ, is now preparing to delete the site from the National Priorities List. The city of Sault Ste. Marie is interested in redeveloping the upland portions of the site for municipal purposes and zoning the shoreline for residential and recreational purposes.

**Kalamazoo River AOC** - USEPA and the MDEQ are overseeing work in the Kalamazoo River on sediments contaminated due to historic releases of polychlorinated biphenyls (PCBs), which originated primarily from de-inking operations at local paper mills. The estimated cost of the removal action is \$30 million.

## **MICHIGAN'S AOCs/SEDIMENTS RESTORATION AND PROTECTION GOAL**

Restore and protect beneficial uses in 14 Michigan AOCs where human activities have caused or are likely to cause impairment of beneficial human uses or the area's ability to support aquatic life and to serve as an important step toward virtual elimination of persistent toxic substances (PTS) within the Great Lakes.

### **RECOMMENDATIONS THAT CAN BE ACCOMPLISHED WITHIN EXISTING FUNDING CONSTRAINTS THROUGH INCREASED COLLABORATION**

It should be noted that Michigan currently has limited funding for the efforts identified below; however, if the Michigan's AOCs/Sediments Restoration and Protection goal is to be achieved, continuation of existing programmatic funding is essential.

- A. Michigan should allocate available federal funding to ensure that delisting criteria for the AOCs in the state are completed by the end of 2008.
- B. Michigan should continue to participate in the Federal-State AOCs Coordinating Committee to better coordinate efforts, optimize existing programs and authorities, and provide a state advocacy role to advance restoration of the AOCs.
- C. Michigan should track BUI removal priorities and actions to document progress in restoring the AOCs.
- D. Michigan should request a proportional share, relative to the number of AOCs, of any increased federal funding for AOCs program implementation.
- E. Michigan should collaborate closely with the USACE Great Lakes RAP Program and habitat restoration initiatives to request funding for projects that advance restoration of the AOCs.
- F. Michigan should coordinate closely with the NOAA habitat restoration initiatives to request funding for projects that advance restoration of the AOCs.
- G. Michigan should collaborate with USEPA, the USACE and the tribes to examine innovative approaches to the ultimate disposition of contaminated sediments as an alternative to the current practice of disposing of them in Confined Disposal Facilities (CDFs) or hazardous waste landfills.
- H. MDNR should continue to partner with the USFWS habitat restoration programs to optimize implementation in AOCs.

### **RECOMMENDATIONS NEEDING ADDITIONAL FUNDING TO ACCOMPLISH**

It should be noted that Michigan may have limited funding for some of the efforts identified below; however, if the AOC goal is to be achieved, significant new resources will be essential.

- A. Michigan should strive to delist three AOCs (restored to target goals) by the end of 2010.

- B. Michigan should strive to remediate all currently known contaminated sediment sites in the AOCs by 2020. This, coupled with restoration measures, will facilitate complete restoration of the AOCs.
- C. Michigan needs to continue to make available state match for federal funding sources to optimize use of available resources. This includes working with federal sources to make rules for matching funds more flexible and transparent.
- D. Habitat restoration in urban areas should be supported at the state level.

## **RECOMMENDATIONS NEEDING CONGRESSIONAL OF FEDERAL AGENCY ACTION**

- A. Michigan should support full appropriations for the Great Lakes Legacy Act.
- B. Congress should support federal funding, at \$3 million annually over the next five years, for the research and development program authorized in Section 306 of the Legacy Act. This research will test and promote viable treatment technologies that allow for the separation, immobilization, neutralization, or destruction of contaminants in sediments; in-situ or after removal. A significant focus of this work should be on the development of technologies that produce no new contaminants and do not release contaminants to the environment.
- C. Michigan should work with the Great Lakes Congressional Delegation to initiate and support the recommendations from the GLRC Strategy on amendments to the Legacy Act to allow for more efficient implementation of the program, as follows:
  - The “maintenance of effort” language in the Legacy Act should be removed because it is not appropriate in the context of sediment remediation where costs often vary widely from year to year and, as a result, can lead to inadvertent disqualification of otherwise eligible and valuable projects.
  - The life of appropriated Legacy Act funds should be extended beyond two years (as envisioned by the Legacy Act) to accommodate both responsible remediation and long-term monitoring of the effectiveness of implemented remedies, which is consistent with the 2002 Great Lakes Strategy.
  - The current 35 percent level of matching funds/in-kind services required under the Legacy Act from the nonfederal sponsor at “orphan sites” should be adjusted to 25 percent, or at a minimum, Legacy Act funds should be available for planning and design work with no match or reduced match, in order to “tee-up” projects and maintain momentum.
  - The current limitation in the Legacy Act which requires exclusive federal agency project implementation precludes disbursement of funds to other entities to assume the lead in project implementation. This requirement restricts the efficient implementation of remedial work in some cases, and should be amended to allow direct disbursement of project funds, which would allow for greater flexibility in implementing the program.
- D. Michigan should work with the Great Lakes Congressional Delegation in support of the Great Lakes Commission’s Legislative Priorities for FY 2009 that are of importance to Michigan, including:
  - Fully fund the Act to remediate contaminated sediments in AOCs. The Great Lakes Act is vital for cleaning up Great Lakes “toxic hot spots.”
  - Appropriate \$10 million to USEPA for distribution to the Great Lakes states and local advisory committees in the 30 USACEs to support development and implementation of RAPs.
  - Appropriate \$1.7 million to USEPA’s GLNPO for program administration.
  - Appropriate \$3 million to USACE for the Great Lakes Remedial Action Program to provide technical analyses and related support.

- Appropriate \$2 million for NOAA's Great Lakes Habitat Restoration Program to restore fish and wildlife resources in the AOCs.

#### **RECOMMENDATIONS NEEDING MICHIGAN LEGISLATIVE ACTION**

- A. Michigan state agencies should work with the Michigan Legislature to secure long-term funding for sediment cleanups by using the Legacy Act to the maximum extent possible to enhance and accelerate the pace of sediment remediation in the AOCs. By making available \$100 million in state funds as a match to federal funds oversight and sediment cleanup related activities could be completed on the Rouge River, River Raisin, Detroit River, and Muskegon Lake AOC.

# *Nonpoint Source*

## **BACKGROUND**

Pollutants that originate from diffuse sources such as fields and parking lots remain among the most significant problems threatening the water quality of Michigan's lakes, streams, wetlands, and groundwater. These NPS pollutants include excessive nutrients, contaminants, microorganisms, sedimentation, and altered flow regimes. These stressors affect Michigan waters through three primary pathways: surface runoff, groundwater infiltration, and atmospheric deposition. The pervasive nature of the problem is widely recognized, although often not well understood.

NPS impacts vary greatly in frequency and severity, affecting plants, wildlife and fish, threatening human health, reducing recreational opportunities, increasing the cost of treating drinking water and dredging our harbors and marinas. Actions to reduce or remove stressors have direct short-term costs, but often save money in the long-term.

To ensure effectiveness, the tools and strategies to address NPS pollution must be coordinated among partner agencies and organizations, and must be geographically targeted. In addition, effective reduction of NPS pollution will also include integrating control strategies with local land use and smart growth initiatives.

Numerous organizations and groups throughout Michigan are taking action to reduce NPS pollution in the Great Lakes Basin. The combination of federal, state, tribal, and local institutions and programs that are already actively involved in reducing NPS pollution has resulted in many successful efforts. Despite the significant progress that has been made, results from a survey conducted by the MDEQ in 2004 identified over \$500 million of unmet funding needs for NPS projects where watershed management plans have been completed.

Michigan's efforts should proactively reduce and prevent NPS pollution and encourage stewardship of the Great Lakes through efforts such as:

- Using a watershed approach,
- Enhancing the watershed approach by addressing forestry, recreation, resource extraction, and transportation-related NPS,
- Support, promote, and facilitate sustainable land use practices and planning,
- Engage local partnerships, and
- Develop NPS tools such as financial and technical assistance, information and education, and regulatory actions.

The Clean Michigan Initiative (CMI) approved by voters in 1998, authorized \$50 million in bonds for NPS prevention and watershed protection projects. To date, the MDEQ has awarded bond funding to local units of government and watershed groups for implementation efforts that have resulted in:



- 646 acres of wetlands being created or restored,
- 9,757 linear feet of stream channels being restored,
- 53,215 linear feet of stream bank stabilized,
- 2,479 acres of permanent easements secured,
- 998 acres of conservation tillage practices being installed,
- 118,548 linear feet of buffer strips being installed.

The CMI has also supported the CREP, a voluntary program that uses environmentally sound conservation practices on agricultural lands to improve water quality, prevent soil erosion, and enhance wildlife habitat. For each dollar the state invests in CREP, the USDA contributes at least four dollars. To date, Michigan has successfully leveraged \$125 million federal dollars through CREP; however, the CMI CREP funding will soon be exhausted.

## SUCCESS STORIES

**Michigan's Conservation Reserve Enhancement Program** - Michigan's CREP was created to help protect our environment and wildlife by encouraging farmers to adopt conservation practices. The MDA, MDNR, MDEQ, Michigan Conservation Districts, and private partners such as Ducks Unlimited, Pheasants Forever, the Michigan Chapter of the Nature Conservancy, and the Joyce Foundation, are partnering with the federal government to implement conservation practices. CREP has been highly successful in protecting Michigan's valuable resources and sustaining its agriculture enterprise. Since CREP began seven years ago, it has been responsible for 35,000 acres of vegetated filter strips, 16,000 acres of wetland restoration practices, 11,000 acres of re-vegetated cropland potentially vulnerable to erosion, and 1,700 acres of windbreaks in Michigan. The response by wildlife to these restored ecosystems has been tremendous. Wildlife species benefiting from CREP practices include songbirds, pheasants, waterfowl, and wild turkey. The MDNR Pheasant Brood survey in the thumb region has found 55 percent of the broods are in or adjacent to CREP lands. Waterfowl surveys conducted by the MDNR in the River Raisin have shown CREP areas have a stable or increasing population, while areas outside of CREP are declining. Michigan Natural Features Inventory (MNFI) and MDNR staff have also observed threatened and endangered species such as Henslow sparrows, Grasshopper sparrows, and Northern harriers on CREP lands.

### Phosphorus Laundry Detergent Ban Legislation Signed

Governor Jennifer M. Granholm recently signed legislation to prohibit the sale or distribution of cleaning agents intended for use in household dishwashers or clothes washers if the cleaning agents contained phosphorus in excess of 0.5% by weight. The prohibition concerning dishwasher cleaning agents will begin July 1, 2010. This legislation will prohibit a person from selling, offering for sale, or distributing for sale or use in this State the following cleaning agents if they contained phosphorus in any form in excess of 0.5% by weight expressed as elemental phosphorus:

- A cleaning agent intended for use in household dishwashers.
- A cleaning agent intended for use with detergent in household clothes washing machines.

**Whetstone Brook Restoration** – This Upper Peninsula NPS project resulted in restoration and permanent protection for Whetstone Brook. For over 130 years, Whetstone Brook had been confined to a culvert under the south railroad yards adjacent to the city of Marquette downtown business district. With a CMI NPS grant, the city of Marquette was able to remove the culvert and restore this section of trout stream to its original condition. To ensure this restoration effort remains, the city of Marquette established permanent vegetative buffers on both sides of the stream. The vegetation filters and cleans area storm water runoff before it enters the brook and provides habitat for plants, animals, and fish.

### **MICHIGAN’S NONPOINT SOURCE GOAL**

To control or eliminate NPS pollution in Michigan to provide for healthy and diverse aquatic ecosystems, protect public health, restore natural hydrology to streams, enhance environmentally compatible recreation opportunities and support a strong and vibrant Michigan economy.

### **RECOMMENDATIONS THAT CAN BE ACCOMPLISHED WITHIN EXISTING FUNDING CONSTRAINTS THROUGH INCREASED COLLABORATION**

It should be noted that Michigan currently has limited funding for the efforts identified below; however, if the NPS goal is to be achieved, continuation of existing programmatic funding is essential.

- A. Michigan should continue to encourage the development and implementation of ordinances and the use of permanent conservation easements to prevent NPS pollution should be encouraged. Michigan intends to accomplish this through support to local agencies in the development and implementation of ordinances that protect water quality, including stormwater, land use development, septic system, riparian buffer, lawn fertilizers and promotion of permanent conservation easements and, encourages impervious surfaces rain gardens and improved soil erosion controls.
- B. Michigan should consider possible means to reengineer local/state/federal environmental management efforts, including looking at current federal and state programs in addition to local watershed management, to look at new ways to address water issues within Michigan to ensure that limited resources are used efficiently and effectively. This could include pursuing local implementation and performance of watershed technology advancements and changing protocol where state agencies functions from an audit perspective. Could also include providing tax authority or utility fees to counties have management districts, drain commissioners or other forms of water management.
- C. Where residues from registered pesticides continue to be detected at or below trigger levels in Michigan surface waters, Michigan should continue to support efforts that provide sufficient delineation of watersheds where these loadings continue to be a problem, and as these areas of concern are detected, MDA should be directed to address these loadings using available regulatory controls.
- D. When alteration of stream channels is necessary, Michigan should promote the use of natural channel design.
- E. Michigan should encourage research on upland land practices and other NPS controls that can be measured to determine what kinds of improvements result in supporting healthy systems (e.g., optimal habitat for species, drinking water, etc.) should be encouraged.

- F. Michigan should evaluate management practices to measure and determine the effectiveness in achieving the desired results of these practices should be evaluated. In addition, consideration should be given encourage flexible with regard to engineering requirements and research.
- G. With recent passage of the Farm Bill, Michigan should work with the USDA Natural Resources Conservation Service to provide full support of state and local agencies to make sure Michigan receives maximum benefit of the programs authorized. These programs include the CRP, the Conservation Security Program, EQIP and the Wetland Restoration Program. Michigan should work cooperatively with USDA to leverage federal Farm Bill funding in all potential programs.
- H. For any future efforts regarding the CREP there needs to be a focus on permanent easements, filter strips and wetland restoration as pollution control alternatives.
- I. To efficiently and effectively use limited resources, Michigan needs to consider providing flexibility in management of stormwater control techniques and to empower local governments. Michigan should also ensure that the management of stormwater is effective and efficient and that sufficient funding is available at the state and local levels.
- J. Michigan should support new efforts to control pollutants such as phosphorus and pharmaceuticals should be undertaken. There was also strong support exists for a statewide ban on phosphorus in lawn fertilizers and dishwasher detergent. Also, this would include the development of an improved phosphorus water quality standard.
- K. Michigan should ensure that Generally Accepted Agricultural Management Practices are protective of streams, inland lakes, groundwater and the Great Lakes.

### **RECOMMENDATIONS NEEDING ADDITIONAL FUNDING TO ACCOMPLISH**

It should be noted that Michigan may have limited funding for some of the efforts identified below; however, if the NPS goal is to be achieved, significant new resources will be essential.

- A. Michigan should encourage the use of watershed management plans or similar tools to target NPS reduction activities to the highest priority places based on meeting specific restoration and/or protection goals should be encouraged. This effort should include enforcement of existing regulations, technical assistance to stakeholders, education and outreach, grants to develop and implement watershed management plans, partnerships with stakeholders and monitoring the effectiveness of these activities. Additional funding is needed for local watershed management plans and high quality rivers and streams, in addition to impaired water and emerging issue related projects.
- B. Michigan should encourage the reduction of agricultural NPS pollutants and flow regime alterations in priority agricultural watersheds. This effort should include implementation of practices such as: filter strips, cover crops, tile line management, no-till, manure/nutrient management, wetland restoration, etc. This would be accomplished by expanding CREP into additional agricultural watersheds, further promoting and implementing the Michigan Agriculture Environmental Assurance Program (MAEAP) and by targeting state dollars toward local Conservation District technical staff to work with landowners.

- C. Michigan should ensure that livestock operations are not a source of environmental impairment. Comprehensive Nutrient Management Plan (CNMP) implementation and enforcement should be pursued, when needed. Michigan should also encourage the use of watershed management plans or similar tools to target nutrient reduction activities at high priority locations based on meeting specific restoration and/or protection goals.
- D. Michigan should improve flow regimes in watersheds affected by hydrologic alterations and reduce stormwater runoff impact in priority urban watersheds through continuation of the stormwater permitting program in qualifying areas and through the development and implementation of watershed management plans. In addition, Michigan should continue to provide technical assistance, education and outreach, and grants to encourage low impact development practices and other stormwater control and management techniques. Also, local watershed groups should be encouraged to provide input to stormwater control issues, where appropriate.
- E. Michigan should restore impaired waters through efforts such as:
  - Developing and submitting to the USEPA up to 50 Total Maximum Daily Load (TMDL).
  - Focusing NPS control activities on impaired waters and document projects that resulted in water quality improvements or restoration of ecological functions.
  - By 2012, attaining water quality standards for all pollutants and impairments in 10 waterbodies listed on Michigan's nonattainment list,
  - By 2012, restoring at least 20 specific causes of water body impairment included on the state's nonattainment list.
  - By 2012, measurably improving water quality conditions in at least five watersheds.
- F. Michigan should increase funding to local conservation districts and watershed groups for NPS programming should be increased.

#### **RECOMMENDATIONS NEEDING CONGRESSIONAL OR FEDERAL AGENCY ACTION**

- A. Michigan should work with the Great Lakes Congressional Delegation should to pursue modifications to CREP to increase the time commitment for keeping specified land out of production and assuring that critical areas near highly vulnerable waters stay out of production permanently.
- B. Michigan should work with the Great Lakes Congressional Delegation to develop and seek new authorization for a Great Lakes Program in the Farm Bill, similar in magnitude to the Chesapeake Bay and Upper Mississippi River programs.
- C. Michigan should work with the Great Lakes Congressional Delegation to initiate and support the following actions from the Great Lakes Strategy and Council of Great Lakes Governors Priorities:
  - New funding for the installation of buffer strips in urban and suburban areas. A new revenue source is needed for municipalities under stormwater permits to install buffer strips in urban and suburban areas. Also needed is new local revenue such as a user fee system that would allow municipalities access to the State Revolving Loan Fund (SRF) for stormwater related projects is needed.
  - Additional funding for conservation tillage through the USDA EQIP to reduce pollutants in impaired waters or to protect high quality waters in Michigan. Critical areas in Michigan for this funding are Saginaw Bay, Lake St. Clair, near-shore waters of Lake Michigan, the Michigan waters of Lake Erie and Michigan's AOCs.
  - New funding in the amount of \$18 million to improve ten urban watersheds to address hydrologic impacts focusing on reducing pollutant loadings through installation of BMPs.

- New funding to develop and implement CNMPs on livestock farms. This would include funding for educational materials, development grants and technical assistance through the USDA Natural Resource Conservation Service.
- D. Michigan should work with the Great Lakes Congressional Delegation should in support of the Great Lakes Commission's Legislative Priorities for FY 2009 that are of Importance to Michigan, including:
- Support fund the Great Lakes Basin Program for Soil Erosion and Sedimentation Control at the current authorized level of \$5 million and tie the program to the priorities of the GLRC Strategy.
- E. Increase appropriations to USEPA for the Section 319 Program, including \$82 million to the Great Lakes states, to implement NPS pollution controls that are critical to improving water quality.

### **RECOMMENDATIONS NEEDING MICHIGAN LEGISLATIVE ACTION**

- A. Pursue enactment of a statewide sanitary code to assure adequate and consistent placement of septic tank tile field systems. The code should establish requirements for septic tank tile field inspections at the time of sale of the property and require county health departments to establish a structure to assure consistent statewide regulation of septic tank tile field systems, without preempting local control. In the interim, Michigan should support local agencies in the development and implementation of septic ordinances, where septic systems are impacting water quality, and instruct homeowners on proper maintenance practices, implementation of alternative treatment technologies, and the development of septic system ordinances.
- B. Pursue enactment of legislation to reduce phosphorus loadings to the environment from:
- Over-application and misapplication of phosphorus containing fertilizers to residential lawns.
  - Phosphorus-containing automatic dishwasher detergent and laundry boosters.
- C. Michigan state agencies should work with the Michigan Legislature should pass legislation providing to secure long-term funding for NPS pollution prevention (P2) and control activities such as:
- NPS watershed management plan development and implementation,
  - CREP, Conservation Technical Assistance Initiative and MAEAP, and
  - Grants to establish conservation easements in support of farmland preservation and of open space preservation for protection of water quality and ecologically sensitive areas.
- D. The Michigan Legislature should support legislation clarifying the process by which local communities can generate revenue for stormwater control and consider development of a statewide stormwater act.

# ***Toxic Pollutants***

## **BACKGROUND**

While certain PTS have been significantly reduced in the Great Lakes Basin ecosystem over the past 30 years, some continue to be detected at levels that potentially pose threats to human and wildlife health, warrant fish consumption advisories in all five Great Lakes, and disrupt a way of life for many in the Basin, particularly the life ways and culture of tribal communities.

Toxic substances can cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological or reproductive malfunctions or physical deformities in any organism or its offspring, or which can become poisonous after concentration in the food chain or in combination with other substances. This toxic pollutant framework includes persistent, bioaccumulative toxic pollutants and other toxic pollutants that also can pose a risk to humans and wildlife because they are persistently released to water bodies and may cause stress to organisms by their presence and exposure in water. Substances that are persistent do not easily break down in the environment and are resistant to natural degradation processes. Bioaccumulation refers to the potential for a substance to be stored in tissue. Exposure to pollutants that are toxic potentially could result in any of the symptoms described above. Substances that are persistent, bioaccumulative and toxic are often referred to as PBTs.

Toxic substance releases originate from contaminated bottom sediments, various industrial processes, NPS, atmospheric deposition, contaminated groundwater, and continuous cycling of toxic substances within the Great Lakes themselves, all contributing to this ongoing problem. More recently, researchers have documented the presence of additional chemicals of emerging concern that may also pose threats to the Great Lakes. The characteristics of these substances, including their sources, releases, fate, transport, persistence, bioaccumulation, and toxicity must be better understood. While there is concern for toxic substances released into the Great Lakes, efforts need to be focused on actions that will address historic deposition of these substances which persist and recycle throughout the environment, as well as to pursue elimination of ongoing and new releases.

## **SUCCESS STORIES**

**Clean Michigan Initiative Bond** - Michigan has invested millions of dollars to reduce and prevent the introduction of PBTs into the Great Lakes ecosystem through programs targeting the reduction of releases and elimination of original sources of mercury, dioxins, pesticides, and other toxic substances. In 1998, Michigan voters approved a \$675 million bond initiative, the Clean Michigan Initiative (CMI), to improve and protect Michigan's water resources. In order to continue the CMI program which has made significant advances in improvements and protection of Michigan's water resources, and to revitalize our state, additional long-term funding is needed.

**Declines of PBTs in Fish** –The state of Michigan and/or federal agencies have regularly monitored contaminant concentrations in fish collected from the Great Lakes for over 30 years. Total Polychlorinated biphenyls (PCB) and total Dichloro-Diphenyl-Trichloroethane (DDT) concentrations in lake trout from Lakes Superior, Michigan, Huron, and Ontario have declined significantly since the early 1970s, although the rate of decline has slowed since the mid-1980s. Concentrations of PCB and DDT have gradually declined in Lake Erie walleye since the mid-1970s as well. Since the early 1990s, PCB and DDT concentrations in fish from the Great Lakes and connecting channels have declined by approximately seven percent per year.

In addition, the MDEQ has been regularly monitoring toxic equivalent (TEQ) concentrations in lake trout from Lake Superior (Keweenaw Bay), Lake Huron (Thunder Bay), and Lake Michigan (Grand Traverse Bay), and in carp from Saginaw Bay. Dioxin concentrations in the Lake Superior and Lake Huron samples have declined an average of five percent per year since the early 1990s; no change has been detected in the Lake Michigan samples.

The MDEQ has been monitoring contaminant levels in fish from 12 fixed-station river impoundment and inland lake trend sites since the early 1990s. Total PCBs and total DDT have each declined an average of eight percent per year, and total chlordane has declined an average of nine percent per year over that time period.

**Superior Watershed Partnership (SWP)** – This 501(c)(3) non-profit organization serves the entire Upper Peninsula (15 counties), including portions of the Lake Superior, Lake Michigan, and Lake Huron watersheds. The SWP has over 15 citizen-based watershed advisory councils. The SWP implements on-the-ground watershed restoration projects, including but not limited to: stream crossing replacements (bridges, culverts), large scale erosion control, dam removals, stream restoration, stormwater management, native species re-introduction, invasive species removal, public access improvements, coastal management, forestry BMP's, agriculture BMP's, etc. The SWP coordinates and funds the Earth Keepers Initiative, a unique coalition of faith communities in Michigan's Upper Peninsula that is taking action to protect public health and the environment (for more information go to: <http://wwwsuperiorwatersheds.org/projects.php?id=5>). Through USEPA, state, local, and tribal partners funding, the Superior Watershed Partnership through its Earth Keepers partners have achieved unprecedented success with annual "Clean Sweep" multi-site one-day (Earth Day) collection events. In 2005 and 2006, Earth Keepers collected and recycled 45.7 tons of household hazardous waste and over 300 tons of electronic waste.

In addition, in 2007, over a ton of pharmaceutical waste collected, including an estimated \$500,000 in narcotics. The SWP also coordinates other community-based P2 efforts, including working with the Keweenaw Bay Indian Community to implement mercury thermometer exchange and fluorescent light bulb disposal programs for tribal members, working with the Superior District Dental Society to install mercury amalgam separators in over 30 dentist offices in Marquette and Alger counties to prevent mercury from entering local waterways, and a public education campaign on burn barrel use for trash disposal, including assisting local units of government with development of zoning ordinances.

**Pesticide Clean-Sweep** – During FY 1995 through 2007 the MDA’s Clean Sweep pesticide collection program has paid for the proper disposal of approximately 1,450,000 pounds of pesticides. In 2005, the program started to record individual pesticides collected using a custom database. The process allows the state to determine active ingredients collected by the program, based on pesticide formulation information maintained by USEPA. Michigan is one of the few states in the country that can provide this level of detail. In FY 2007 the program collected and disposed of over 142,000 pounds of pesticides. Included in this total was more than 810 pounds of chlordane, 690 pounds of arsenic-containing pesticides, and over 480 pounds of DDT. More than one-third of the submissions, by formulated weight, were unknown pesticides. These are primarily products that have been re packaged at some point, and/or have no labels or registration numbers. The proper disposal of almost 52,000 pounds of unknown pesticides represents a substantial reduction in risk to Michigan’s population and the environment.

**Dairy Manometers** - A Michigan dairy farm mercury manometer exchange program was piloted in 1998 and expanded statewide in 2000. Manometers are used to measure the suction pressure on the dairy milking machinery. The exchange program was co-sponsored by the MDA and the MDEQ. It offered dairy farmers up to \$250 credit toward the cost of replacing mercury manometers with mercury-free vacuum gauges. In all, the project replaced 131 mercury manometers and collected 158 pounds of liquid elemental mercury.

**Michigan Schools** - A significant effort in Michigan has been made to eliminate mercury in schools as required by PA 376 of 2000 which required mercury elimination in K-12 schools by 2004. Letters and CDs with elimination guidelines were sent to all Michigan schools, various workshops were held and follow-up surveys and guidance were provided in 2005 by the MDEQ, MDCH, and Michigan Department of Education. Working with USEPA, the MDEQ also successfully removed 1,823 mercury-containing items, 293 pounds of mercury compounds and 971 of elemental mercury in Michigan schools from 2004-2006 (for more information go to [www.michigan.gov/mercury](http://www.michigan.gov/mercury) and [www.michigan.gov/deq](http://www.michigan.gov/deq)).

### **Dental Mercury Collection**

Governor Jennifer M. Granholm recently signed legislation limiting mercury discharges from dentist offices. The new law requires dentists to install amalgam separators. Amalgam is the compound most commonly used to fill cavities in teeth. It is an alloy that contains mercury bound together with other metals. Although amalgam is safe in the human mouth, mercury released into the environment can contaminate the food chain, mainly fish, ultimately harming the health of humans who eat mercury-contaminated fish. When a dentist fills a cavity or removes an old filling, mercury used in the amalgam can be mixed in with waste water, contributing to mercury contamination in surface and ground water. By December 31, 2013, dentists subject to the bill will have to install and use a separator on each wastewater drain in the dentist's office that was used to discharge dental amalgam.

## **MICHIGAN TOXIC SUBSTANCES GOAL**

Michigan concurs with the GLRC Strategy to adopt a long-term goal of virtually eliminating the release of, and exposure, to PBTs and other toxic substances into the Great Lakes Basin ecosystem to protect human health, fisheries and wildlife populations, and the aquatic environment. The goal of elimination will be sought within the most expedient time frame, through the most appropriate common sense, practical and cost-effective mix of voluntary, regulatory, and



incentive-based actions. Michigan recognizes that complete removal may not be practical from open waters, bottom sediments, or landfill leachate for some PTS. Therefore, Michigan qualifies elimination of PTS from the ecosystem to concentrations that will be protective of public health and the environment.

### **RECOMMENDATIONS THAT CAN BE ACCOMPLISHED WITHIN EXISTING FUNDING CONSTRAINTS THROUGH INCREASED COLLABORATION**

It should be noted that Michigan currently has limited funding for the efforts identified below; however, if the Toxic Pollutants goal is to be achieved, continuation of existing programmatic funding is essential.

- A. Michigan should continue to address ongoing releases from historically contaminated environmental media through source control and other remedial methods to attempt to virtually eliminate the release of toxic substances by eliminating the principal sources of mercury, PCBs, dioxins and furans, pesticides, and other toxic substances that threaten the health of the Great Lakes Basin ecosystem. For example, the MDEQ should:
  - Continue to implement cleanup requirements that include emphasis on source removal and source control, including reservoir sources of toxic substances in contaminated soils and sediments,
  - Continue to implement cleanup requirements for contaminated groundwater venting to surface waters as established by administrative statute and rule to assure compliance with the GLWQA and Great Lakes Toxic Substance Control Agreement,
  - Evaluate and revise, if appropriate, cleanup criteria to incorporate knowledge gained through research and studies in the areas of contaminant fate and transport and risk assessment,
  - Continue to implement requirements for responsible parties to supply the necessary data for development of criteria for emerging contaminants, and
  - Use successful remediation projects in Michigan as models to follow to further address the cleanup of other sites contaminated with toxic substances.
- B. Michigan should continue regional, national, and international efforts that address long-range transport and deposition of PBTs.
- C. The MDEQ should continue the promulgation of administrative rules to control mercury emissions from coal-fired electric generating units 90 percent by 2015.
- D. The MDEQ should take delegation of USEPA's area source rules for electric arc furnaces and iron and steel foundries to reduce mercury emissions from these sources that melt scrap metal which includes automobile switches that contain mercury.
- E. Michigan should implement the MDEQ's Mercury Strategy Staff Report as revised, August 2008, focusing on the top ten priority recommendations, including:
  - Continue to implement activities that phase out mercury-added products where viable alternatives exist. Adopt additional mercury product phase outs and adopt laws that follow the Northeast Waste Management Officials Association's Model Legislation.
  - Utilize the USEPA "5m" approach under the Clean Water Act to satisfy appropriate mercury total maximum daily load (TMDL) development requirements, using the MDEQ Mercury Strategy as a tool for implementation to address waters impaired by atmospheric deposition.

- Michigan should implement the GLRC Strategy's Mercury Products Phase-Down Strategy and the GLRC Strategy's Mercury Emissions Reduction Initiative to complete phase-outs of mercury uses, including, as practical, a mercury waste management component and to address unregulated sources of mercury emissions.
- F. Michigan should continue to participate in the national Quicksilver Caucus to better coordinate national and international mercury reduction efforts, as well as, to develop a national and international mercury collection program with an associated sequestering infrastructure.
- G. To reduce airborne sources of dioxins and furans to the Great Lakes, Michigan should continue to support activities to address deficiencies in Michigan's household hazardous waste collection infrastructure for household waste collection and agricultural plastic waste burning and support enforcement efforts to stop illegal waste/household trash burning. In addition, Michigan should implement outreach plans with local governments and health departments on human health risks regarding exposure to dioxins and furans.
- H. Michigan should continue efforts that address airborne sources of dioxins and furans to the Great Lakes including potential sources such as hazardous waste incinerators.
- I. The MDEQ and MDCH should continue activities to ensure that the risks of exposure to dioxins and furans within the Saginaw Bay watershed specifically the Tittabawassee River south of Midland, the Saginaw River, and Saginaw Bay are adequately mitigated.
- J. To eliminate the release of PCBs into the Great Lakes Basin ecosystem, Michigan should collaborate with utilities and other stakeholders to voluntarily phase out PCB containing capacitors. In addition, Michigan should be consistent with the Stockholm Convention on Persistent Organic Pollutants, by decommissioning and properly disposing of electrical equipment containing PCBs.
- H. A consistent set of messages from agencies and local health and environmental agencies is needed to protect the public from health effects of PTS exposure and to provide the public with lifestyle choices to reduce PTS uses and releases to the Great Lakes. Michigan should protect human health, fish and wildlife populations, and the aquatic environment from toxic substances by preventing the exposure to PTS through effective outreach and education, including:
  - Conducting education and outreach activities on proper use and disposal of mercury-added products to prevent exposure, developing brochures and training documents to address the burning of household trash and agricultural plastic wastes, and increasing education and incentives for replacing old wood burning stoves.
  - Michigan should develop and implement an education and outreach campaign consistent with existing messages and in coordination with stakeholder groups that focuses on habits of at risk individuals, households, the workplace, and schools to help the public do its part to reduce the use and release of PBTs and other toxic substances.
- K. In conjunction with the USEPA, Michigan should continue focused sampling of the Saginaw Bay watershed, specifically, the Tittabawassee River south of Midland, the Saginaw River, and Saginaw Bay, taking property use into consideration. Michigan should also continue to assess the risks of consumption of fish and wild game in the Saginaw Bay watershed and provide updated information on consumption advisories to the affected communities as it becomes available.
- L. Michigan should prevent new toxic chemicals from entering the Great Lakes by promoting environmentally responsible chemical innovations targeting production, use and disposal practices in Michigan through strategic deployment of P2 and waste minimization programs. Examples include:

- Providing easier access and broaden participation in P2 and waste minimization programs to small and medium sized businesses.
  - “Bundling” technical assistance services, such as compliance assistance, P2, and energy efficiency (E2) audits, in “one-stop-shopping” programs.
  - Creating policies that are precautionary, and encourage research, development, and implementation of innovative chemical technologies that are environmentally safe, cost competitive, and effective.
  - Promoting the use of “green” chemical technologies that reduce or eliminate the use or generation of hazardous substances during the design, manufacturing, and use of chemical products and processes.
  - Encouraging the use of safer, less toxic, or non-toxic chemical alternatives to hazardous substances to promote sustainable economic development within the state.
- M. Michigan should continue to address regional PTS issues through participation in the Binational Toxics Strategy Substance/Sector Workgroup led by the USEPA and Environment Canada.
- N. Michigan should continue to work with the Agency for Toxic Substances and Disease Registry to address regional, national, and international toxic substances issues.
- O. Michigan should encourage the reformulation of products with less toxic substance content by creating an information clearinghouse. The clearinghouse would provide chemical and toxicological information along with suggested chemical substitutes to industry. This could result in a significant reduction of production and use of toxic chemicals.
- P. Michigan should create tax incentives and utilize low interest loans to promote investments in E2 upgrades and P2 projects.
- Q. Michigan should ensure that traditional regulatory programs, including enforcement, provide incentives to conduct P2 and E2 projects.
- R. Michigan should implement recommendations of the MDEQ Toxics Steering Group report on polybrominated diphenylethers (PBDEs).
- S. Michigan should continue to participate in the Binational Toxics Strategy Dioxin subgroup for coordination of activities on a regional level.
- T. Michigan should continue to address abandoned oil and natural gas wells to ensure proper closures.
- U. Michigan should continue to examine storage implications and transportation and disposal of nuclear waste options to assure protection of public health and the Great Lakes environment.
- V. Michigan state agencies should continue to collaborate in review and consideration of current and future mining activities and proposals and subsequent assessments of ecological and economical impacts.
- W. Michigan should continue to examine storage implications and options for the disposal of radioactive waste from nuclear power plants and other waste generators to assure protection of public health and the Great Lakes environment.

### **RECOMMENDATIONS NEEDING ADDITIONAL FUNDING TO ACCOMPLISH**

It should be noted that Michigan may have limited funding for some of the efforts identified below; however, if the Toxic Pollutants goal is to be achieved, significant new resources will be essential.

- A. The MDEQ should develop rules to control mercury emissions from the Portland Cement sector or adopt USEPA's maximum achievable control technology standard revision (as recommended in the MDEQ's Mercury Strategy Staff Report).
- B. Michigan should remediate reservoir sources of dioxins and furans in contaminated environmental media, including soil and sediment, to prevent further release of these toxic substances to the Great Lakes with the ultimate goal of lifting the fish and wild game advisories. In addition, Michigan should develop and implement remediation plans for sites of dioxin and furan contamination that are protective of the environment and human health, including sensitive subpopulations such as children and women of childbearing age.
- C. Michigan should commit long-term funding to ensure a robust and ongoing waste pesticide collection program. In addition, Michigan should promote take back and other waste collection programs.
- D. The MDCH and the MDEQ should participate in the regional effort to create consistent advice on fish and wildlife consumption to citizens in the Great Lakes Basin, with particular emphasis for sensitive populations and health care professionals. The MDCH should conduct research that includes the use of public focus groups to identify a format for fish and game advisories that are usable and understandable for all citizens of Michigan and consider providing the information in multiple languages and literacy levels.
- E. Michigan should fully fund the Michigan Family Fish Consumption Guide, including funding to update, print, and distribute the Advisory, as well as, programs to provide health education messages promoting the health benefits of regular fish consumption while encouraging safe consumption of Great Lakes fish.
- F. Michigan should identify watersheds or water bodies that are at risk or are currently undergoing assessment of NPS pollutant loadings such as atrazine and should develop strategies with the USEPA's GLNPO and other agencies to address these problems. In some cases, residues from registered pesticide such as atrazine continue to be detected at or below trigger levels in Michigan surface waters. As areas of concern are detected, the MDA should be directed to reduce potential NPS using available regulatory controls.
- G. Michigan should identify and fill gaps in the scientific understanding that limit the ability to effectively manage the risks of toxic substances found in the Great Lakes and to identify and understand the emerging toxic substances of concern. Specifically, Michigan should implement screening/long-term monitoring of sources of toxic substances and concentrations in environmental media, including humans and wildlife to include:
  - A strategic review of the Toxic Substances Control Act-regulated substances and other federally regulated substances, using current P2 models;
  - Enhanced Great Lakes monitoring programs to include chemicals of emerging concern; and
  - Conduct research on chemical properties, exposure, and long-term effects.
- H. Michigan should conduct modeling, incorporating evaluation and enhancement of current models, to better predict environmental impacts of reduction actions at various geographic scales, and to examine exposure scenarios.
- I. Michigan should develop an easily-accessible, centralized Great Lakes toxics database for monitoring data, emission and release information, and research results to include a clearinghouse for toxicity data to be used to develop Great Lakes Initiative (GLI) criteria, and state GLI water quality standards.
- J. Michigan should investigate and explore the development of a mechanism to ensure that mercury collected or recovered in Michigan is used only for essential uses. In addition, MDEQ should explore the current barriers regarding the ability to restrict exportation of nonessential mercury uses to other states or countries (as recommended in the MDEQ's Mercury Strategy Staff Report).

- K. Michigan should conduct monitoring of emerging contaminants such as pharmaceuticals (e.g. human and veterinary) and personal care products, bisphenol A and phthalates and nanomaterials to investigate potential sources, releases and impacts as well as determine adverse impacts to aquatic life from exposure to these emerging contaminants. In addition, Michigan should support research on water treatment technology and educational efforts aimed at reducing the release of emerging contaminants.
- L. Michigan should implement additional pharmaceutical collection programs modeled after other successful community-based programs, for example, the Lake Superior Watershed Council's Earth Keepers Initiative.
- M. Michigan should develop criteria to regulate water discharges of perfluorinated compounds.
- N. Michigan should implement reduction activities to eliminate water discharges of emerging contaminants.

#### **RECOMMENDATIONS NEEDING CONGRESSIONAL OR FEDERAL AGENCY ACTION**

- A. Michigan should work with the Great Lakes Congressional Delegation to support efforts to reduce regional, national, continental, and global sources of PBTs to the Great Lakes Basin from atmospheric transport and deposition by restoring the Great Lakes Atmospheric Deposition (GLAD) funding administered by the Great Lakes Commission.
- B. Michigan should work with the Great Lakes Congressional Delegation to initiate and support the following actions from the GLRC Strategy:
  - Ratification of the Stockholm Convention on Persistent Organic Pollutants.
  - International PTS management and monitoring programs, in coordination with the Commission for Environmental Cooperation and the United Nations Environment Program (UNEP), and support capacity building and technology transfer programs, such as those administered by USEPA's Office of International Activities.
  - Efforts to reduce international sources of mercury, including funding and technical support for UNEP's mercury efforts.
- C. Michigan should work with the Great Lakes Congressional Delegation in support of the Great Lakes Commission's Legislative Priorities for FY 2009 that are of importance to Michigan, including:
  - Appropriating \$2 million to USEPA GLNPO to be distributed to the states and tribes to expand the program under the Great Lakes Initiative (GLI) and continue mercury monitoring, fish contaminant assessments, and community education.
- D. Michigan should work with the Great Lakes Congressional Delegation in support of the Council of Great Lakes Governors Great Lakes Restoration and Protection Near Term Action Items for FY 2009, including:
  - \$1 million in 2009 in ongoing funds to continue tribal fish tissue contaminant analysis programs and related community education programs and an additional \$100,000 to facilitate tribal participation in a mercury stewardship program for the Great Lakes states.
  - \$100,000 for monitoring new chemical contaminants is needed in the Great Lakes Basin. Emerging chemicals of concern are little understood and pose a potentially serious threat to aquatic life and wildlife in the Basin.

## **RECOMMENDATIONS NEEDING MICHIGAN LEGISLATIVE ACTION**

- A. The Michigan Legislature should pass legislation providing long-term funding for:
  - Environmental response activities at facilities and historical sites of PTS contamination where no liable party exists to conduct remedial activities.
  - Public education and outreach regarding the Michigan Fish Consumption Advisory, as well as update and revise chemical-specific trigger levels used to determine human health impacts of fish consumption and support use of the best available science to set Advisory trigger levels.
  - P2 and recycling efforts.
- B. The Michigan Legislature should pass legislation:
  - Requiring dental amalgam separators.
  - Amending Part 55 to set a particulate standard to address fine particulate emissions from new outdoor wood boilers and potential mercury emissions.
  - Banning uncontrolled burning of household and plastic waste used in agricultural applications to reduce dioxin emissions.
- C. Michigan should secure long-term funding for the continued collection and proper disposal of mercury-containing items through community based clean sweep activities.

# *Indicators and Information*

## **BACKGROUND**

Protection and restoration of Michigan's Great Lakes watersheds require a well-documented, collaborative strategy, access to the best scientific information available, research to provide that information, and coordinated action. A successful restoration strategy for the Great Lakes must include an informed decision making process based on consistent methods to measure and monitor key indicators of ecosystem function. Once collected, information needs to be compiled and communicated consistently to inform the restoration process, decision-makers, and the public.

Assessing progress towards restoring the Great Lakes requires a comprehensive network of monitoring/observing systems to provide high-quality data for managers, scientists, and the public to determine environmental quality status and trends and to evaluate the effectiveness of prevention, remediation, and restoration activities. As part of this effort, there is a need to identify and report on a set of responsive, scientifically valid and representative environmental indicators. In addition, it is essential that agencies collecting environmental data use standardized methods, data standards, and data management systems. To move forward in this protection and restoration process, it is important that resource managers, scientists, and the public have ready access to environmental data through user-friendly systems, and agencies to communicate information in a timely, accurate, and understandable fashion.

## **SUCCESS STORIES**

**Providing Real Time Air Quality Information** - In 2006, the MDEQ rolled out MIair, an Internet tool that displays near real-time data, maps, and charts. MIair provides timely air quality information for Michigan residents via the initial easy-to-understand Air Quality Index graphic for those who want simplicity, yet allowing detail for those who prefer more comprehensive technical information. The announcements and forecast portion allow the MDEQ to provide updated information in real-time. MIair features the following:

- Air Quality Index (AQI) - The AQI is a health indicator useful for making decisions about daily activity levels.
- ACTION! Days - An Action! Day is issued when poor air quality is expected.
- ENVIROFLASH - EnviroFlash sends automated messages about air quality via e-mail and/or cell phones.
- Ozone Maps - The current day eight-hour average ozone concentration is reported.
- PM2.5 Maps - The current 24-hour average fine particle concentrations are reported.

**Expanding Water Quality Monitoring Efforts, Michigan Clean Water Corps (MiCorps)** - Governor Jennifer M. Granholm issued Executive Order 2003-15 creating the MiCorps to assist the MDEQ in collecting and sharing water quality data. The MiCorps expands volunteer water quality monitoring statewide for the purpose of collecting, sharing, and using reliable data; educates and informs the public about water quality issues; and fosters

water resource stewardship. The MiCorps Program provides training for stream and lake monitoring, disseminates methods for accurate data collection, implements effective quality assurance practices, facilitates reporting and information sharing online, and provides a forum for communication and support among volunteer monitoring groups in Michigan. The program will continue improvements in access and use for this important effort.

### **MICHIGAN'S GREAT LAKES INDICATOR-INFORMATION GOAL**

Standardize and enhance scientifically valid methods by which information is collected, recorded, and shared within Michigan to provide high-quality data for managers, scientists, and the public to measure environmental quality status and trends and to evaluate the effectiveness of prevention, remediation, and restoration activities

### **RECOMMENDATIONS THAT CAN BE ACCOMPLISHED WITHIN EXISTING FUNDING CONSTRAINTS THROUGH INCREASED COLLABORATION**

It should be noted that Michigan currently has limited funding for the efforts identified below; however, if the Indicator-Information goal is to be achieved, continuation of existing programmatic funding is essential.

- A. Michigan should continue to work with the other Great Lakes states, federal, and local interests to develop and improve a comprehensive network of monitoring/observation systems to provide high-quality data for managers, scientists, and the public to measure environmental quality status and trends, to evaluate the effectiveness of restoration and prevention activities, and provide a clear picture of water quality. This network should be continually improved to adapt to technological advances and emerging needs. This effort should include:
  - Continually updating (every three years) the Michigan portion of the Great Lakes Commission's Great Lakes monitoring inventory.
  - Developing a clear articulation of monitoring objectives to ensure effective, efficient monitoring. A panel with representatives from state monitoring agencies should be convened to identify Great Lakes management and information needs.
  - Identifying existing monitoring gaps and proposing options for filling those gaps.
  - Re-assessing the overall Great Lakes monitoring effort to ensure that activities are efficient, produce useful data and meet management objectives.
  - Communicating the information needs for Great Lakes restoration to Great Lakes interagency groups (i.e., Lake Technical Committees of the Great Lakes Fishery Commission, Great Lakes Interagency Task Force, Great Lakes Observing System, Integrated Earth Observation System, and Integrated Ocean-Observing System as part of the Global Earth Observing System of Systems).
  - Continuing to support the National Wetlands Inventory (NWI) Update being completed by Ducks Unlimited. Following the completion of the current project, support for continued updating of the NWI to monitor long-term wetlands trends is essential.
- B. Michigan should identify and report on a set of responsive, scientifically valid, and representative environmental indicators. This should include:



- Reviewing the State of the Lakes Ecosystem Conference (SOLEC) indicators to identify those already being assessed in Michigan and to determine others that could be efficiently incorporated into existing activities.
  - Reviewing indicator needs identified in other assessments of information needs (e.g., Michigan's Wildlife Action Plan, The Nature Conservancy's Aquatic Ecoregional Planning document, Great Lakes Regional Needs Assessment, Great Lakes Regional Research Information Network, and the Prescription for Great Lakes Ecosystem Protection and Restoration).
  - Identify and defining the desired endpoints and periodically re-assessing indicators to ensure relevancy and effectiveness.
  - Reviewing the Michigan State of the Great Lakes Report as a reporting mechanism for indicators.
  - Collectively undertaking a "big picture" look at the status of the Great Lakes.
- C. Michigan should seek to work with all agencies collecting environmental data to standardized methods, and to develop data standards and data management systems. Decision-support tools should be flexible and offer enhanced abilities for multi-participant decision making. Predictive modeling tools should be applied to priority restoration issues, where appropriate. This includes:
- When multiple agencies collect similar types of data (e.g., fish community and bacteria in water), the use of consistent or comparable methods should be encouraged to allow for more efficient data aggregation and reporting.
  - Investing in the most up-to-date but proven technology for monitoring and decision-support.
  - Following the 2004 Environmental Data Standards Council's Environmental Sampling, Analysis, and Results protocol, that includes voluntary guidelines to improve data consistency and comparability.
  - For monitoring projects, following approved Quality Assurance Project Plans to allow users assess to data quality.
  - Using common database and Geographic Information System (GIS) software, as feasible, to encourage data consistency and sharing.
  - Supporting the collection and use of voluntary monitoring data, as appropriate.
- D. Michigan should ensure that resource managers, scientists, and the public have ready access to environmental data through user-friendly systems, and agencies communicate information in a timely, accurate fashion. This includes:
- Periodically updating, expanding and evaluating the Michigan Surface Water Information Management System to include additional databases from other media.
  - Redesigning the Michigan Air Emissions Reporting System.
  - Housing environmental data in searchable databases and maps that are accessible on the Internet, including land and resource use restrictions that have been imposed to protect the public and the environment from hazards at contaminated sites. Existing examples include the fish contaminant monitoring database and the beach monitoring database.
  - Investing additional resources to develop, manage, and maintain databases and database applications to ensure easy access by multiple users.
  - Consider reorganizing the triennial MDEQ/MDNR State of the Environment Report from reporting on a program-specific basis to one integrating data across media and possibly by area (e.g., Great Lakes nearshore, coastal, and tributary/upland).
  - Collecting and aggregating existing data sets to populate the Great Lakes GIS and the Great Lakes bottomlands GIS, including an inventory of existing data sets and identification of data and information gaps (MDEQ and MDNR).

- Developing an atlas of Michigan's Great Lakes coast through identification of existing data sets and creating a Web-based coastal atlas (MDEQ and MDNR).
  - Continuing to provide current wetland geographic information to Michigan citizens in a readily usable format.
  - Continuing to support the development, including staff training, of biological assessment field manuals, which are currently being prepared by Michigan State University and Central Michigan University using the most current Michigan-specific protocols.
- E. Michigan should develop research and assessment and reporting systems related to energy issues including:
- Development of a process for measuring and reporting energy consumption to be used by all state departments, including a mechanism to calculate each department's carbon footprint.
  - Development of a GIS-based decision support tool for lakebed alteration in association with windmill siting (in cooperation with the MDNR Fisheries and University of Michigan), completing lakebed mapping, review and identifying gaps in datasets.

#### **RECOMMENDATIONS NEEDING ADDITIONAL FUNDING TO ACCOMPLISH**

It should be noted that Michigan may have limited funding for some of the efforts identified below; however, if the Indicator-Information goal is to be achieved, significant new resources will be essential.

- A. Michigan should develop a wetland-related monitoring and reporting program, including:
- Developing a statewide program to assess wetland condition by incorporating the evaluation of wetlands into routine Basin-wide water quality monitoring, including development of a wetland monitoring framework and ensuring wetland monitoring results are incorporated into federal water quality reports.
  - Using the Michigan Rapid Assessment Method (MiRAM), a sample of wetlands should be evaluated, including field testing of MiRAM and provide training to agency staff.
  - Implementing bioassessment protocols developed by Michigan State University and Central Michigan University and the Great Lakes Coastal Wetland consortium in a statistically significant number of wetlands.
  - Conducting NWI and landscape level functional assessments in major watersheds of the Lower Peninsula, including training workshops for local planners and watershed groups. In the future, continue to create functional assessments for developing areas in the Upper Peninsula.
  - Evaluating the MDEQ's ability to implement a long-term monitoring program for Great Lakes coastal wetlands.

#### **RECOMMENDATIONS NEEDING CONGRESSIONAL OR FEDERAL AGENCY ACTION**

- A. Michigan should work with the Great Lakes Congressional Delegation in support of the Great Lakes Commission's Legislative Priorities for FY 2009 that are of importance to Michigan including:

- Passing the Coastal and Ocean Observation System Act (S. 950) and appropriating \$150 million annually to NOAA to implement the Act, with an equitable share to support the Great Lakes Observing System.
- B. Michigan should work with the Great Lakes Congressional Delegation to increase the capacity to assess trends to observe long-term change and detect the emergence of new issues (e.g., new invasive species). The SOLEC process to develop indicators should be completed for a full suite of 80 indicators, with particular attention to the use of indicators that will measure the success of the measures recommended in the GLRC Strategy. Additional funding of \$800,000 should be provided toward this end. In addition, a “top ten” list of indicators should be developed and reported to the public on an annual basis.
- C. The Great Lakes Federal Interagency Task Force should be asked to review monitoring programs among its member agencies to ensure effective and efficient gathering and reporting of data. The Task Force should coordinate with the states and tribes to optimize the effectiveness of monitoring investments throughout the region.
- D. Michigan should work with the Great Lakes Congressional Delegation to implement and support the following actions from the GLRC Strategy:
- Supporting Great Lakes restoration activities with appropriate scientific foresight, planning, and assurance of results.
  - Providing adequate funding to support a Great Lakes Research Office as authorized in the 1987 Clean Water Act Amendments (33 U.S.C. 1268) to coordinate these research efforts and the overall federal research budget to the Great Lakes should be doubled over the next five years.
  - Dedicating at least 10 percent of all new appropriations in support of Great Lake’ restoration activities toward research to aid planning and assessment.

### **RECOMMENDATIONS NEEDING MICHIGAN LEGISLATIVE ACTION**

- A. The MDEQ should work with the Michigan Legislature to develop a long-term program to secure state funding for water quality monitoring and monitoring in restoration projects.

# *Sustainable Development*

## BACKGROUND

In the 1987 Report of the Brundtland Commission, *Our Common Future*, the term sustainable development is defined as:

“Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”

Natural land-based (along with water and air) resources must remain sound if our lives are to be healthy and our land is to support economic potential and social vitality. If the goal of sustainable land development is to be met, the needs and acknowledged challenges of the economy, the environment, and communities, a transformation will be needed from competition to collaboration among interests that plan for development and manage the land. To do this, a path to development must be envisioned that emphasizes efficient, careful and integrated resources utilization, protection, and reuse, along with ecosystem protection and restoration.

Sustainable development is a process utilized toward achieving balance between economic, societal, and ecological needs within an ecosystem. The Great Lakes are of global significance yet our region has not fully integrated the philosophy of sustainability into all aspects of the use, development, restoration, and conservation of Great Lakes resources. Sustainability works from the bottom-up, and is rooted in the actions and decisions by individuals, private enterprises and local communities.

## SUCCESS STORIES

**Protecting Michigan’s Groundwater** – The MDA, in conjunction with Michigan’s conservation districts, works with farmers and landowners through a variety of programs to voluntarily adopt practices that are environmentally and economically sustainable and that contribute to the vitality of rural communities. One of those programs, the Michigan Groundwater Stewardship Program (MGSP), is a legislatively enabled partnership, which helps Michigan residents reduce the risks of groundwater contamination associated with pesticide and nitrogen fertilizer use. The MGSP effectively addresses these risks through a variety of program areas that target agricultural, residential, and golf course user groups. Through a contribution

### Electronic Waste Recycling Takeback

Governor Jennifer M. Granholm is expected to sign electronic waste recycling bills requiring companies that sell computers in Michigan to establish takeback programs. The legislation will require manufacturers that sell new covered electronic devices to register annually with the MDEQ, for the MDEQ to maintain a list of registered manufacturers on its website and beginning April 1, 2010, prohibit a manufacturer from selling a new covered electronic device unless the manufacturer had a takeback program and create the Electronic Waste Advisory Council.

agreement with the USDA, the MGSP has been able to leverage federal resources to assist landowners implement over 300 conservation practices. Through the sustainable use practices promoted by the MGSP and other programs, Michigan's agricultural community will continue to be a part of the solution in reducing risk to our environment.

**Sustainable Grand Rapids** – Grand Rapids is now recognized as a city committed to creating a new municipal government paradigm built on local solutions, stakeholder involvement, regional collaboration, and community reinvestment. Lead by progressive politicians, aggressive administrators, and collaborative community stakeholders, the city of Grand Rapids, following the lead of local well-established and successful businesses, non-profits, faith-based, and academic partners in the search for sustainability, now finds itself in the company of other popular sustainable regions in the nation highly desired as places to live, work, learn, and play. Adopting the philosophy of “living today without jeopardizing the ability of future generations to live equally as well or better,” the City of Grand Rapids’ Commission approved the position of Sustainability Manager in January 2007 to begin addressing the challenges of the next century and the issues founded in the past one. Community leaders embraced sustainability with others around the country and began looking for transformational changes in the community that would move Grand Rapids into the future as a stronger and more viable city. Waste elimination, energy and water conservation, renewable energy development, construction of Leadership in Energy and Environmental Design (LEED)-certified buildings, illiteracy, homelessness, new job creation, and local economic development are some of the areas identified for change to move the community forward in a positive manner.

## **MICHIGAN’S SUSTAINABLE DEVELOPMENT GOAL**

The activities of Michigan's citizens and public and private entities support a strong and vibrant Michigan economy, meeting societal and cultural needs while incorporating the principles of sustainability into their practices and sharing a sense of commitment to protect and enhance and be wise stewards of the waters, lands and related resources of the state of Michigan.

## **RECOMMENDATIONS THAT CAN BE ACCOMPLISHED WITHIN EXISTING FUNDING CONSTRAINTS THROUGH INCREASED COLLABORATION**

It should be noted that Michigan currently has limited funding for the efforts identified below; however, if the Sustainable Development goal is to be achieved, continuation of existing programmatic funding is essential.

- A. Michigan should adapt and maintain programs that promote sustainability across all sectors, governmental and non-governmental, public and private should be adapted and maintained. All state and local agencies and institutions, as appropriate, should develop and implement sustainable development principles or statewide policy statements applicable to regulatory and funding actions and to the state government's own operation.

Such principles must include insuring that adequate resources are provided for activities that would support sustainable development. The statement of principles should include:

- Committing to the principles of sustainable development, to the protection and restoration of a strong and resilient environment, and to the maintenance of ecosystem services that are essential for a strong economic future.
- Ensuring that the state's activities will, to every extent possible, avoid promoting development that will directly or cumulatively contribute to the degradation of the Great Lakes or the states other water, air, land or biotic resources.
- Encouraging development that balances the social and cultural needs of Michigan's citizens with the need to maintain diverse and resilient ecosystems.
- Encouraging Smart Growth opportunities within Michigan communities.
  - Encouraging the use of alternative energy sources and ensuring environmental impacts of current energy sources are minimized.
  - Encourage treating the Great Lakes as an economic asset and as such they will be protected because of the value they provide.
  - Encourage tribal participation in Michigan's Great Lakes protection and restoration efforts.

B. Michigan should take actions to ensure that state and local governance is aligned to enhance sustainability planning activities and sustainable resource management should be undertaken, including:

- Working with all interested parties to develop sustainability indicators and utilizing those indicators to measure continual improvement and as a guide in state government decision making and action.
- Applying integrated resource planning techniques and the precautionary principle to all regulatory actions regarding infrastructure development.
- Making available model ordinances incorporating BMPs and having success in achieving environmental goals. Areas of emphasis should include issues related to shoreline development and nearshore water use such as wind turbine siting.
- Supporting mitigation in a manner consistent with the principles of sustainable development.
- Continuing to promote programs that will reduce the impact of natural hazards, including flood management, stormwater management, and management of high risk erosion areas.
- Ensuring state and local policies are not impediments to Great Lakes protection and restoration (e.g. need to resolve current conflicts with native landscaping, curb and gutter, etc).
- Developing green jobs conference(s) and reporting on the status of Green Jobs Initiative.
- Supporting the long-range transportation plan goal of stewardship associated with being good stewards of Michigan's transportation resources.
- Continuing and expanding land conservation incentives through partnerships with land conservancies and other local efforts.
- Considering seeking designation of the Great Lakes Basin as a World Heritage Site and utilize this designation as a marketing tool for tourism.
- Identifying the costs and benefits of protecting and restoring the Great Lakes with quantitative and qualitative information, including the consequences of failure to act.
- Streamlining regulatory processes associated with implementing protection and restoration measures and reducing fees for restoration efforts.
- Reviewing efforts of other states and Canadian provinces that are already implementing successful protection and restoration activities (e.g. Chesapeake Bay area, Maryland) to ensure a regional approach to restoration and protection.

- Identifying potential impacts of state and federal tax codes on the implementation of protection and restoration measures.
  - Reviewing existing statutes (e.g. Michigan Natural Resources and Environmental Protection Act) to ensure they reflect the current global economy in the light of Great Lakes protection and restoration ensuring the statutes adequately protect Great Lakes resources.
  - Reviewing current and proposed state funding programs to ensure priority ranking of watersheds that having the greatest impact on the Great Lakes and ensuring funding programs, to the extent feasible, are flexible to allow local innovation.
  - Initiating new and maintain existing watershed or regional partnerships with emphasis on rural, multi-ecosystem watersheds that incorporate sustainable criteria.
  - Developing implementation teams organized by watershed or region of the state.
  - Providing opportunities to share experiences of implementing sustainable practices statewide through conferences and other means.
  - Working with local communities to prioritize implementation of low impact development.
- C. There is need for a transformational effort to move agencies and the public in the direction needed to undertake Great Lakes protection and restoration. This includes:
- Considering possible means to reengineer local/state/federal environmental management efforts, including looking at current federal and state programs in addition to local watershed management, to look at new ways to address water issues within Michigan to ensure that limited resources are used efficiently and effectively.
  - Continuing maintenance and improvement of the state's surface water conveyance and storm water infrastructure with an emphasis on:
    - a) Managing surface water flows to encourage infiltration.
    - b) Providing greater and more diverse incentives or regulatory capability for riparian stewardship practices.
    - c) Increasing investment in hydrography data by enhancing the stream gauge network and performing a comprehensive public drain inventory.
  - Developing methods to assist state and local effort to identify the actual cost of services provide (total cost accounting, triple bottom line), including identification of environmental costs.
- D. Michigan should take actions necessary to ensure state, local, federal, and tribal partnerships are strengthened and that outreach brands Michigan and the Great Lakes as an exceptional, healthy, and competitive place to live, work, invest, and play. This includes:
- Strengthening collaboration among state agencies and incorporating public participation.
  - Promoting the tenets of Smartgrowth through public outreach and inter-agency forums.
  - Integrating water quality improvement within the Smartgrowth message in the Citizen Planner Program.
  - Increasing the number of lodging establishments certified under Michigan Green Lodging Program.
  - Continuing the working partnership with the Michigan port cities through the continued development of the Port Cities Collaborative.
  - Continuing the working partnerships through the Saginaw Bay Coastal Initiative.
  - Building on Michigan's heritage by promoting the development of underwater preserves within Michigan waters.
  - Supporting inclusion of Michigan's Marine Protected Areas in the national system of Marine Protected Areas.
  - Increasing public participation in green home tours offered by community energy centers.
  - Enhancing the capacity of Great Lakes ports and marinas to implement BMPs.

- E. Michigan should identify means to promote statewide voluntary actions to assist in the protection and restoration of Michigan Great Lakes. This includes:
- Identifying means to mobilize volunteerism working with environmental organizations such as local land conservancies e.g. possibly develop a website that includes volunteer opportunities.
  - Identifying means to increase community involvement to get children in the outdoors and to be good stewards
  - Developing an outreach campaign on the report to get beyond those who are already involved and inform people about what they can do individually to help the Great Lakes.
  - Supporting the “No Child Left Inside” initiative and use the MI-Great Lakes Plan to inform the electorate.
  - Identifying means to raise awareness of citizens on important Great Lakes issues.
  - Developing a volunteer web site where people interested in volunteering could go to identify potential volunteer possibilities.
  - Pursuing water reuse and recycling, where feasible.
- F. Michigan should take measures to ensure statewide environmental and natural resource based educational programs are improved and expanded to provide Michigan citizens at all levels with an understanding of the importance of our actions on the Great Lakes ecosystem should be developed. This includes:
- Developing additional education and outreach modules on sustainability and promote their incorporation into school curriculum and after school activities. This could include collaborating with the Michigan Earth Science Teachers Association to strengthen Great Lakes curricula in schools.
  - Educating and providing information about best sustainability practices to all county, local and tribal governments in Michigan.
  - Enhancing online clearinghouses to provide additional capacity for education and outreach, tourism and products, and local watershed planning initiatives.
  - Conducting demonstration projects using the best available technologies and practices.
  - Enhancing the capacity of local communities to apply sustainability through training and technical assistance.
  - Providing opportunities for people to be engaged with the water resources of the state to build stewardship.
  - Developing means to increase awareness and stewardship of citizens on the importance Great Lakes issues, including the value of the resources, why people should care, and the benefits to communities.
  - Working with community colleges to be more actively engaged in the area in educating people about planning, Great Lakes issues, etc.
  - Identifying means to share successful planning tools with small communities (e.g. Michigan State University’s Citizens’ planner training).
  - Providing means to better inform the public as to the environmental state of the Great Lakes.
- G. Michigan should pursue all forms of alternative energy sources to ensure that the environmental impacts of current energy sources are minimized. In addition new energy policies and energy production need to be considered with regard to their effects on the Great Lakes. This includes:
- Supporting and encouraging the use of solar and wind power through continued mapping, technical assistance, anemometer loan programs, and regulatory action.
  - Creating new awards to recognize excellence in sustainable development within the Great Lakes, including programs for excellence in energy efficiency.



- Supporting federal efforts to implement diesel retrofit programs by supporting and encouraging local efforts to seek and secure grants to conduct retrofit programs.
  - Supporting the use of injection wells for carbon sequestration in regional brine aquifers and for enhanced oil and gas recovery by participating in the Midwest Regional Carbon Sequestration Partnership and promoting passage of appropriate legislation.
  - Considering the potential use of Phragmites and algae as biofuels.
  - Considering the energy policy and energy production with regard to their effects on the Great Lakes (nuclear plant closure, hydroelectric dam renovation).
- H. In its own operations, Michigan state government should set an example by applying sustainability criteria and the precautionary principle in the development of all management plans and programs. This includes:
- Identifying and celebrating success stories and actively sharing information with all county, local, and tribal governments.
  - Proactively addressing climate change mitigation and adaptation by completing in-state efforts, such as the Michigan Climate Action Council process and development and implementation of a comprehensive Climate Change Plan for Michigan. Michigan should also continue working with other Midwestern states to implement the Midwestern Greenhouse Gas Reduction Accord.

### **RECOMMENDATIONS NEEDING ADDITIONAL FUNDING TO ACCOMPLISH**

It should be noted that Michigan may have limited funding for some of the efforts identified below; however, if the Sustainable Development goal is to be accomplished, continuation of existing programmatic funding with additional funding will be required.

- A. Provide long-term funding for Michigan should provide leadership for sustainable development by:
- Developing a long-term funding proposal for brownfield redevelopment grants and loans.
  - Developing a long-term funding proposal for waterfront improvements that support sustainable development.
  - Developing a long-term funding proposal for pollution prevention activities that support sustainable development.
- B. Leadership should be provided to:
- Developing mechanisms to assist local governments with match funds required to secure federal and state funding.
  - Improving the use and reuse of our lands by implementing recommendations of the 2003 Michigan's Land, Michigan's Future land use report.
- C. Michigan should implement Governor Jennifer M. Granholm's Green Chemistry Executive Directive should be implemented directing actions to reduce or eliminate the use and generation of hazardous substances by awarding green chemistry grants to build a base for green chemistry and the creation of a Green Chemistry Award Program.
- D. Michigan should put a priority should be put on implementing low impact development design standards on all new development projects and support continued technical assistance, education and outreach, and grants to encourage low impact development practices and other stormwater control and management techniques.

- E. Michigan should support efforts to increase opportunities for the public to access the Great Lakes and our inland lakes and streams, including ensuring harbors are dredged to support our recreational and commercial shipping should be supported. Michigan should ensure access to harbors by providing funding for dredging activities and controlling invasive species.
- F. Michigan should build incentives in the state revenue sharing process to encourage protection and restoration efforts. Michigan should reward local governments based on those that collaborate on such efforts.
- G. Michigan should support and encourage the use of solar and wind power through continued mapping, technical assistance, grants, anemometer loan programs, and regulatory action should be supported and encouraged.

### **RECOMMENDATIONS NEEDING CONGRESSIONAL OR FEDERAL AGENCY ACTION**

- A. Michigan should work with the Great Lakes Congressional Delegation to initiate and support the following action from the GLRC Strategy:
  - Requiring federal agencies to review existing grant, loan and subsidy programs and incorporate sustainability criteria to provide priority for those projects that pursue sustainable objectives.
  - Increasing funding for federal and state grant programs that encourage communities to re-use brownfields and to revitalize lakeside and tributary waterfronts.
  - Increasing federal funding for development of an implementation plan for the recommendations in the GLRC Strategy that utilizes sustainable development as the overarching guide.
  - Appropriate \$7 million to USEPA for state technical assistance to harness the benefits of green chemistry and increase pollution prevention, energy efficiency and compliance assistance services.
- B. Michigan should work with Congress to pursue funding to improve the infrastructure within Michigan's communities, including funding to control CSOs, improve wastewater and water systems treatment facilities.
- C. Michigan should work with the Great Lakes Congressional Delegation should in support of the Great Lakes Commission's Legislative Priorities for FY 2009 that are of importance to Michigan, including:
  - Reauthorizing the Clean Water Act with provisions that USEPA review prioritization formulas so that projects that advance sustainable development principles can be awarded higher priority for funding or a more favorable loan interest rate.
  - In addition to restoring funding for the Clean Water State Revolving Fund, fully funding the Drinking Water State Revolving Loan Fund and increasing flexibility in how the funds may be used for upgrading water infrastructure and improving water conservation and use efficiency.

## **RECOMMENDATIONS NEEDING MICHIGAN LEGISLATIVE ACTION**

- A. Michigan should demonstrate leadership for sustainable development by providing long-term funding sustainable efforts such as brownfield redevelopment grants and loans, waterfront improvements, pollution prevention activities. In addition, Michigan should develop mechanisms to assist local governments with match funds required to secure federal and state funding.
- B. The Michigan Legislature should support sustainable energy production and consumption in state government operations, in all of the state's related regulatory capacities, through all forms of state financial assistance, and as a primary component of all economic development programming. Michigan needs to ensure that alternative energy sources are pursued and the environmental impacts of current energy sources are minimized. In addition, new energy policies and energy production need to be considered with regard to their effects on the Great Lakes.
- C. The Michigan Legislature should proactively address climate change mitigation and adaptation.
- D. The Michigan Legislature should promote the adopting of new commercial and residential energy codes that provide energy savings equivalent to similar codes in other Great Lakes states.
- E. The Michigan Legislature should provide funding to improve the infrastructure within Michigan's communities, including funding to control CSOs, improve wastewater and water systems treatment facilities.
- F. The Michigan Legislature should enact a statewide sanitary code to improve on-site waste treatment
- G. The Michigan Legislature should provide funding to continue to address brownfields redevelopment.
- H. The Michigan Legislature should rewrite the bottle law to include other popular containers.

## **MICHIGAN CLIMATE ACTION COUNCIL**

An important aspect of sustainable development in Michigan is the impact of greenhouse gases on the Great Lakes. The world's scientific community has concluded with a very high level of confidence that emissions of greenhouse gases are causing the Earth's climate to warm. In 2007, Governor Jennifer M. Granholm issued Executive Order No. 2007-42 establishing the Michigan Climate Action Council (MCAC). The MCAC will act in an advisory capacity to:

- Produce an inventory and forecast of greenhouse gas sources and emissions from 1990-2020.
- Consider potential state and multi-state actions to mitigate and adapt to climate change in various sectors, including energy supply, energy efficiency and conservation, industrial process and waste management, transportation and land use, and agriculture and forestry.
- Develop a comprehensive climate action plan with specific recommendations for reducing greenhouse gases in Michigan by business, government and the general public.
- Advise state and local government on measures to address climate change.

As a first phase, the MCAC has developed an interim report with a list of policy recommendations on reducing greenhouse gas emissions to meet short-, mid-, and long-term goals or targets. In the second phase, the MCAC will issue a comprehensive climate change plan for Michigan (completion date – March

2009). The plan will further develop the policy recommendations in the interim report and include an assessment of climate change impacts to Michigan, including likelihood of occurrence, and recommendations for adaptive measures. The MCAC will also recommend legislation to support its recommendations.

When this plan is complete, the state of Michigan can play an important role in reducing greenhouse gas emissions through encouraging technology innovation and the adoption of policies that provide net economic and environmental benefits. The recommendations of the plan should be incorporated into the Michigan Great Lakes protection and restoration efforts.

## ACRONYMS

AIS – Aquatic Invasive Species	MDA - Michigan Department of Agriculture
ANSTF - Aquatic Nuisance Species Task Force	MDCH - Michigan Department of Community Health
AOCs - Areas of Concern	MDEQ - Michigan Department of Environmental Quality
AQI - Air Quality Index	MDNR - Michigan Department of Natural Resources
BEACH Act- Beaches Environmental Assessment and Coastal Health Act	MGSP - Michigan Groundwater Stewardship Program
BUIs - Beneficial use impairments	MiRAM - Michigan Rapid Assessment Method
BMPs - Best Management Practices	MUCC - Michigan United Conservation Clubs
CDF – Confined Disposal Facilities	NEWMOA - Northeast Waste Management Officials' Association
CMI – Clean Michigan Initiative Bond	NOAA - National Ocean and Atmospheric Administration
CELCP - Coastal and Estuarine Land Conservation Program	NPS - Nonpoint source
CNMP - Comprehensive Nutrient Management Program	NAWCA - North American Wetlands Conservation Act
CREP - Conservation Reserve Enhancement Program	NWI - National Wetland Inventory
CRP – Conservation Reserve Program	OGL - Office of the Great Lakes
CSO - Combined sewer overflow	P2 - pollution prevention
CTAI - Conservation Technical Assistance Initiative	PCBs - Polychlorinated biphenyls
CZMA – Coastal Zone Management Act	PBTs - Persistent bioaccumulative toxics
DDT - Dichloro-Diphenyl-Trichloroethane	PTS - Persistent toxic substances
E2 - energy efficiency	RAP - Remedial Action Plan
EA – Environmental Area	SRF - State Revolving Fund
EQIP - Environmental Quality Incentives Program	SSOs - Sanitary Sewer Overflows
FSA - Federal Farm Service Agency	SOLEC - State of the Lake Ecosystem Conference
GIS - Geographic Information System	SWP - Source Water Protection
GLI - Great Lakes Initiative	TMDL - Total Mass Daily Load
GLRC - Great Lakes Regional Collaboration	USDA – U.S. Department of Agriculture
GLWQA - United States/Canada Great Lakes Water Quality Agreement	USACE – U.S. Army Corps of Engineers
GLNPO - USEPA Great Lakes National Program Office	USEPA – U.S. Environmental Protection Agency
HACCP - Hazard Analysis and Critical Control Point	USFWS - U.S. Fish and Wildlife Service
IAT - Internal Action Teams	WRP - Wetland Reserve Program
LEED - Leadership in Energy and Environmental Design	
Legacy Act - Great Lakes Legacy Act	
MAEAP - Michigan Agriculture Environmental Assurance Program	
MCAC – Michigan Climate Action Council	
MiCorps - Michigan Clean Water Corps	

## REFERENCES

1. University of Michigan - Michigan Sea Grant. 2008. Michigan Jobs, Economic Vitality, and the Great Lakes, unpublished paper.
2. Brookings Institution. 2007. America's North Coast: A Benefit - Cost Analysis of a Program to Protect and Restore the Great Lakes. Washington D.C.
3. Brookings Institution. 2008. Place-Specific Benefits of Great Lakes Restoration. Washington D.C.
4. Rural America. 2002. Economic Impact of Water/Sewer Facilities on Rural and Urban Communities.
5. U.S. Conference of Mayors Water Council. 2008. Local Government Investment in Municipal Water and Sewer Infrastructure: Adding Value to the National Economy.
6. Alliance for the Great Lakes. 2009. Water Works, How Water Conservation Can Create Jobs & Leave Our Nation's Waters Better for Future Generations.